THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXX. No. 1787.] LONDON, AUGUST 10, 1897. [49TH YEAR. PRICE 6d.

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FOR
GAS, STEAM, WATER,
AND ALL PURPOSES,
ALSO
COILS OF EVERY SIZE AND SHAPE.

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Imperial Tube Works, Monmore Green,
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ESTABLISHED 1861.

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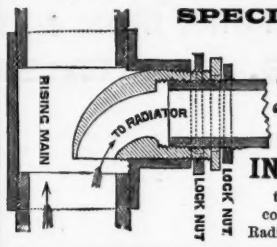

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MORE STEAM.
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LESS SMOKE.

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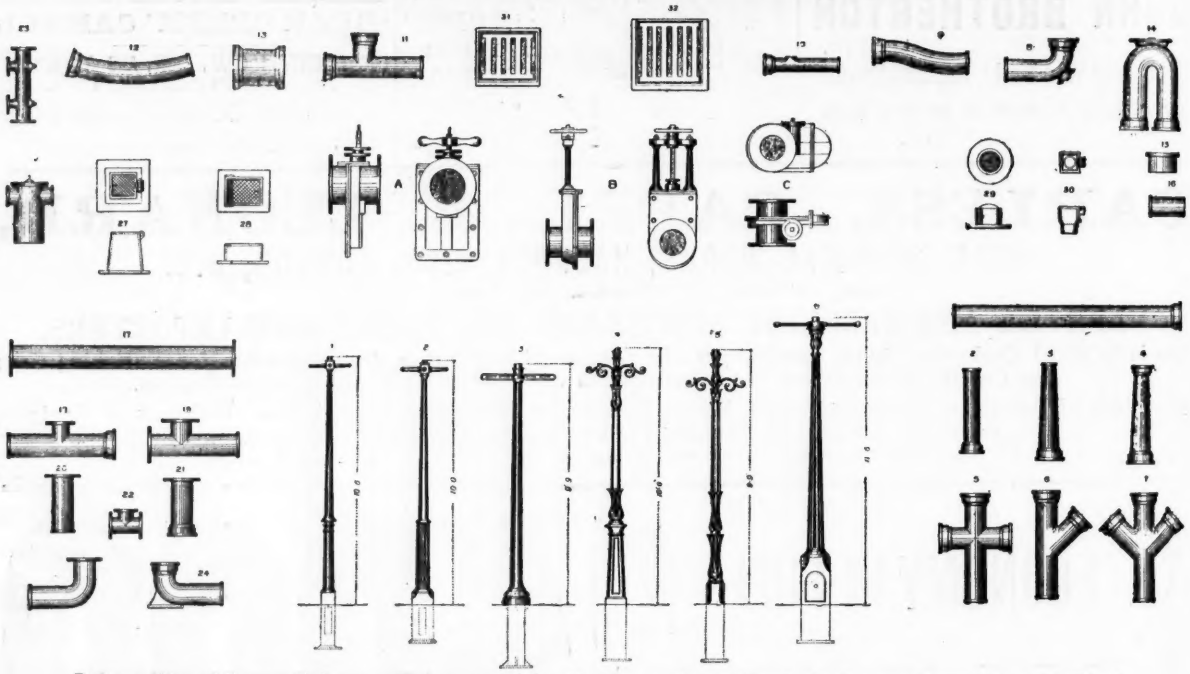

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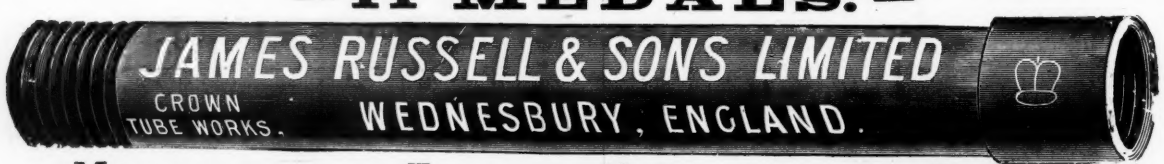

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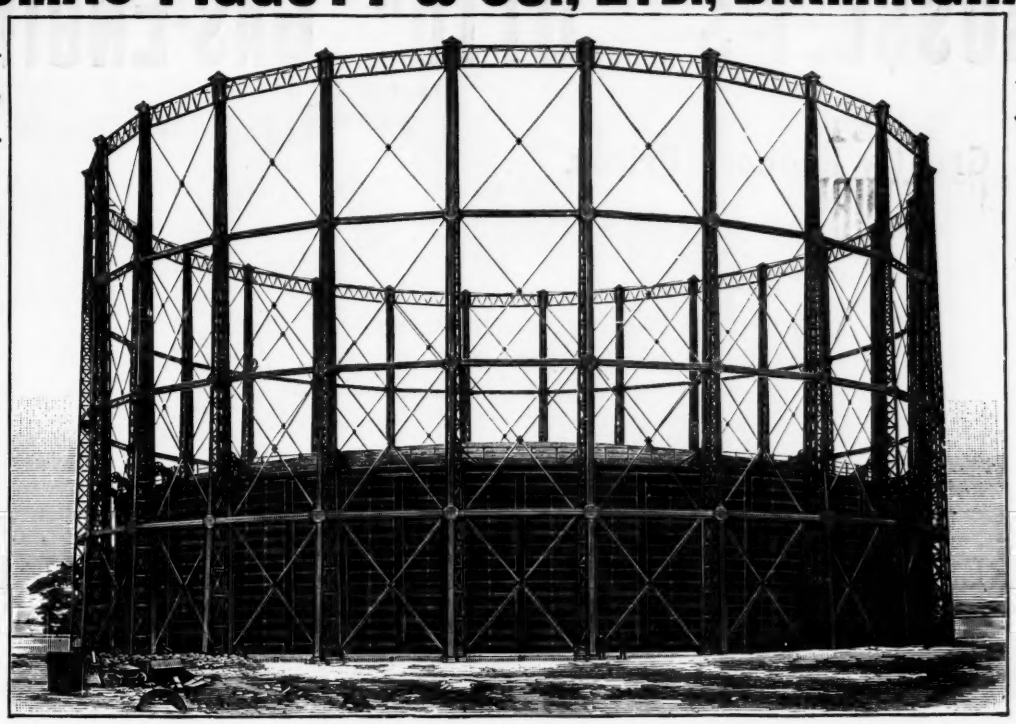

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PATENT CARBURETTED WATER-GAS PLANT.

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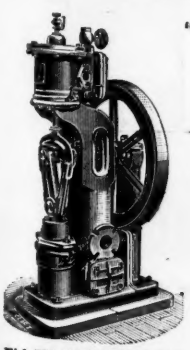

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

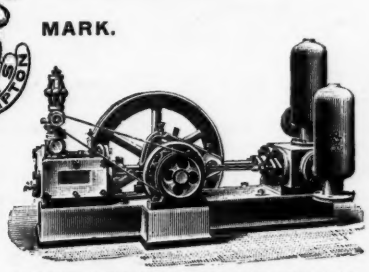

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

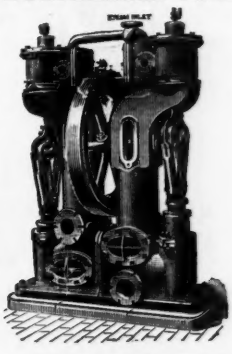

Fig. 712. "DOUBLE-RAM" STEAM-PUMP

CROSSLEY'S "OTTO" GAS-ENGINES

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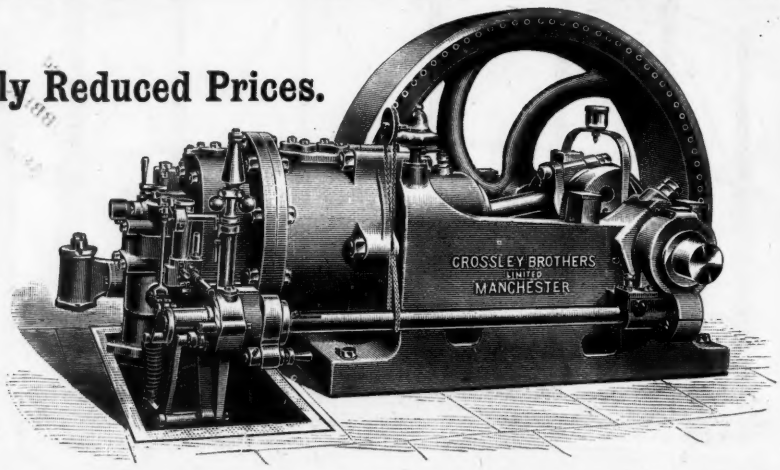

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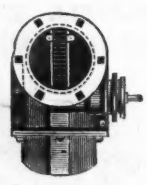
Gasholder Tanks.



CAST-IRON RETORTS,
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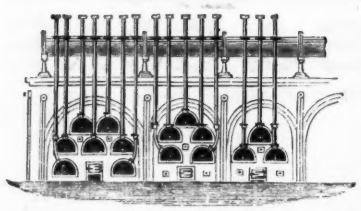

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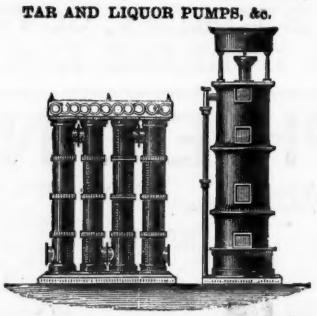

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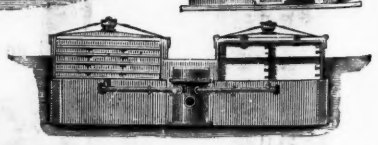

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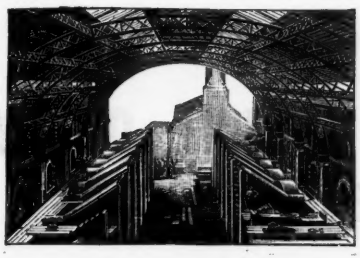

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PATENT SCRUBBER-WASHERS,
All sizes,
From 50,000 to 5,000,000 Cubic Feet of Gas per day.
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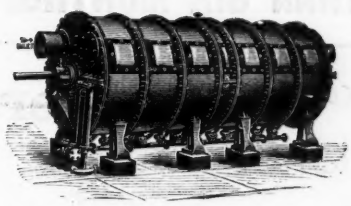

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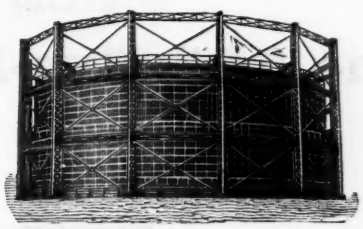

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FOR ENRICHING GAS IN BULK.

Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching

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CUBIC FEET OF GAS PER DAY.

Among the Companies supplied are The Gaslight and Coke Company, the South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **FOUR YEARS.**

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The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

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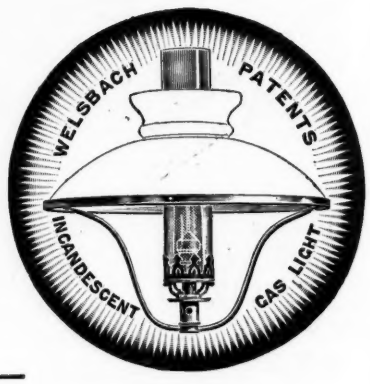

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CARBONIZING PLANT,

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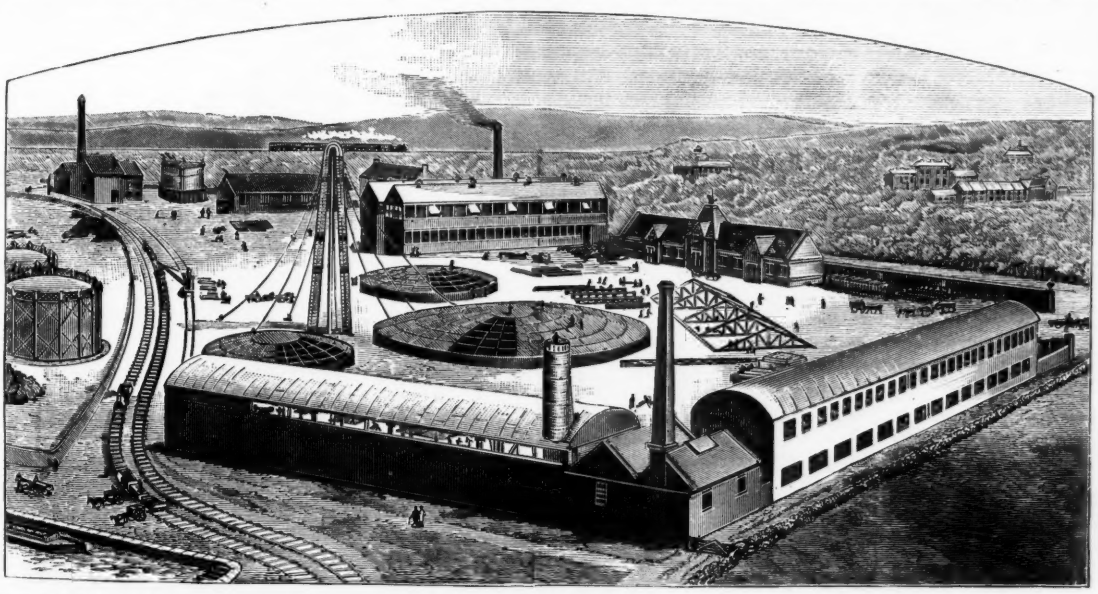

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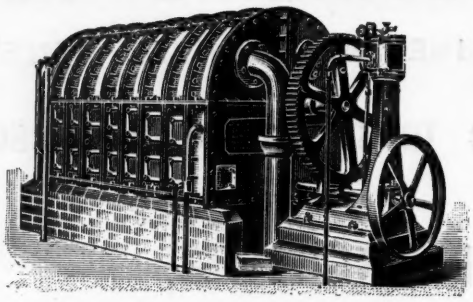

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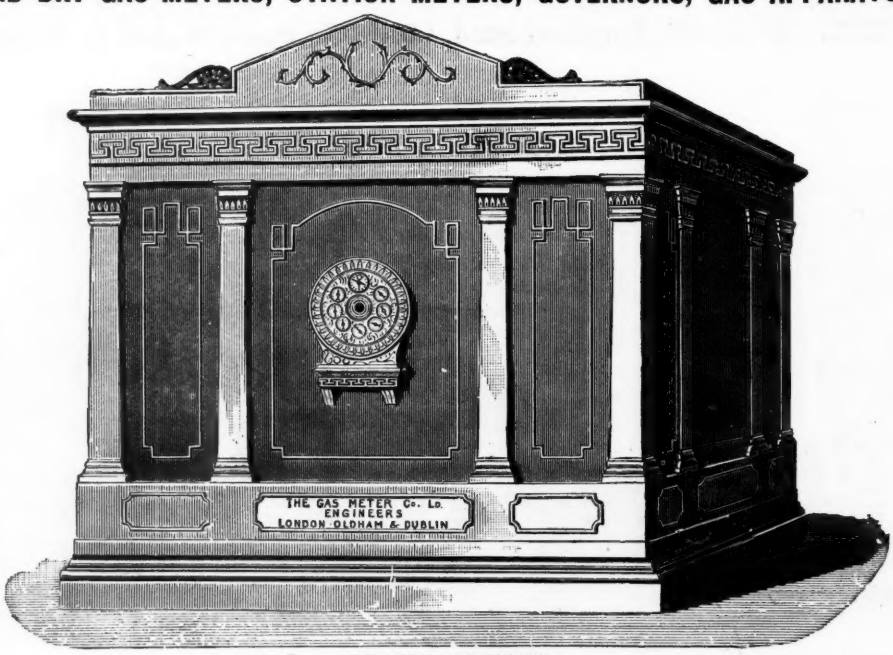

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Belfast	1,700,000	Winchester	200,000
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Glasgow	300,000	Hoylake	125,000
Brussels	700,000	Shanghai	225,000
Brussels (Second Contract)	700,000	Stockport	500,000
Liverpool	3,500,000	St. Joseph, Mo.	750,000
Tottenham	750,000	Lea Bridge	350,000
Tottenham (Second Contract)	750,000	Lea Bridge (Second Contract)	350,000
Santiago	400,000	Guildford	350,000
Swansea	750,000	Stockton-on-Tees	500,000
Manchester	3,000,000	Syracuse, N.Y.	850,000
Brighton	1,750,000	Brentford	1,200,000
Preston	1,500,000	Commercial Gas Co.	850,000
New York	1,200,000	Commercial Gas Co. (Second Contract)	850,000
Southport	750,000	Bridlington	125,000
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Coventry	600,000	Rotterdam	850,000
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Bordentown, N.J.	125,000		

THE GASLIGHT AND COKE CO. { Nine Elms / Bromley } . . . . . 6,250,000 Cubic Feet.

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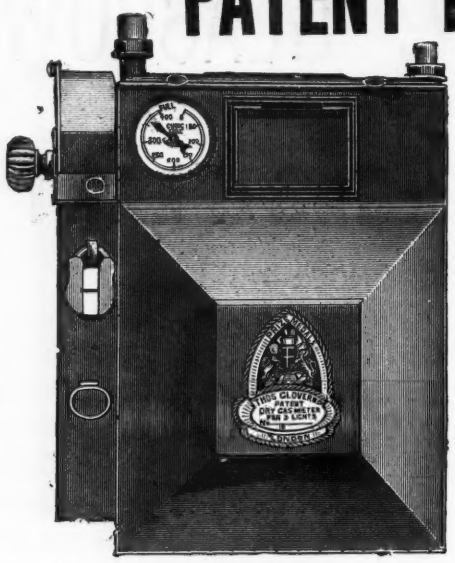

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[See also Advt., p. 356.

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The Turning of a Leaf of the History of The Gaslight and Coke Company . . . 311
Result of the Plymouth Nuisance Litigation . . . 313
The Dispute in the Engineering Trade . . . 313

WATER AND SANITARY AFFAIRS—
The Government and the Metropolitan Water Question . . . 313

ESSAYS, COMMENTARIES, AND REVIEWS:—
Gas and Water Companies in the Stock Market . . . 314
Electric Lighting Memoranda . . . 314
First Proceedings under the Conciliation (Trade Disputes) Act . 315

NOTES:—
The Mechanical Stacking of Coke . . . 316
The Coal-Tar Colour Industry in England . . . 316

TECHNICAL RECORD:—
North British Association of Gas Managers—The Annual Meeting at Ayr—
Ways and Means of Increasing Gas Consumption. By Hubert Pooley, of Dunfermline . . . 316
Prepayment Meters. By T. Wilson, of Coatbridge . . . 320
The Best and Most Economical Means of Gas Purification. By D. M. Nelson, of Glasgow . . . 321
British Association of Water-Works Engineers—The Annual Meeting in London—
Mr. W. Ingham on the Torquay Water-Works . . . 324
Mr. A. Towler on Pumping Machinery . . . 325

CORRESPONDENCE:—
The Manufacturing Wages of The Gaslight and Coke Company . 327
The Determination of Sulphur in Spent Oxide . . . 327

PARLIAMENTARY INTELLIGENCE:—
House of Lords—The Metropolitan Water Companies Bill; Bills Royal Assented . . . 327
House of Commons—Southwark and Vauxhall Water Bill; East London Water Supply . . . 328
House of Lords Committee—Southwark and Vauxhall Water Bill 328

LEGAL INTELLIGENCE:—
Judicial Committee of the Privy Council—The Laying of Pipes and Wires in Montreal . . . 330
High Court of Justice—
Official Referee's Court—Ward *v.* Plymouth Gas Company . . 331
Queen's Bench Division—Wickens *v.* West Ham Gas Company 333
Liverpool Summer Assizes—Tyldesley-with-Shakerley District Council *v.* Atherton District Council . . . 333
The Incandescent Gas-Light Company's Patents . . . 334

MISCELLANEOUS:—
Meeting of The Gaslight and Coke Company . . . 334
Meeting of the Crystal Palace District Gas Company . . . 337
Brentford Gas Company—The Half-Yearly Report and Accounts. 338
Bromley Gas Consumers' Company—The Half-Yearly Report and Accounts . . . 338
Manchester Corporation Gas Supply—The Gas Committee and the Out-Townships; The Prepayment Meter System . . . 338
Bonus Day at the South Metropolitan Gas-Works—To-Day and Sixty and Seven Years Since . . . 339
Electric Lighting Notes . . . 340
Notes from Scotland . . . 340
Gas and Water Companies' Stock and Share List . . . 341
Current Sales of Gas Products . . . 341
Coal Trade Reports . . . 342

PARAGRAPHS:—
PERSONAL: Mr. T. Ridley; Mr. Frank Morris; Mr. J. Husband . . . 314
The Award in the Ashford Gas-Works Arbitration . . . 314
Institution of Mechanical Engineers . . . 323
The Sanitary Institute—Proposed Electric Lighting Clauses Consolidation Bill—The Disturbance of the Streets of Vienna . . 326
Incandescent Gas Lighting at Ongar—Water-Works and Lighting for Brazil—The Water Supply of Bishop Auckland . . . 327
Tipton Gas-Works—The Salford Corporation and the Automatic Gas-Retort Company—Newcastle-under-Lyme Gas Accounts—South Hants Water Company . . . 334
Mullingar Water Supply—New Joint-Stock Companies—Gas and Electric Lighting Affairs at Chorley . . . 339
Fenton District Council Gas-Works—The Cost of the Parliamentary Proceedings in Connection with the Gravesend Water Question—The Proposed Sale of the Liskeard Water-Works . 340
Reductions in Price—The Proposed Purchase of the Mid-Sussex Water-Works by the Cuckfield District Council—The Assessment of the Lancaster Corporation Gas-Works . . . 342
Sales of Shares—The Winding-Up of the Matlock Bath Gas Company, Limited—The Relations of Water Companies and Consumers in New York—The Ampthill Water-Divining Case—The New Water Supply for Eastbourne . . . 343

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EDITORIAL NOTES.

The Turning of a Leaf of the History of The Gaslight and Coke Company.

THE meeting of The Gaslight and Coke Company last Friday was an occasion of great importance in the history of this enormous undertaking; and we desire to treat it in a manner to bring out this aspect of the proceedings. On the face of it, the gathering was strictly after the usual pattern; but the matter of the speeches made on both sides of the table, and of several features which lay somewhat in the background, was exceptionally weighty. In the first place, the meeting was the last of the old *régime* with which the name and fame of the late Mr. J. Orwell Phillips are so closely identified. The key-note of this strain of reflection was set in the beginning of the Governor's address, which acknowledged, in fitting terms, the high importance of the work of the late Secretary and General Manager during the long period of his control of the Company's fortunes. It would indeed be impossible to overrate, as it is difficult to define, the quality of this service. Governors and Directors came and went; but for the lifetime of a complete generation Mr. Phillips was the Company, to all intents and purposes. His was one of the most remarkable personalities that has ever attained eminence, in any capacity, in the gas industry; and he has left a name which will be long remembered with respect and admiration.

At the same time, it cannot be overlooked that the late Secretary and General Manager of The Gaslight and Coke Company had the defects of his qualities. He was a statesman, diplomatist, and politician of unsurpassed insight into and grasp of Metropolitan gas interests through a critical period. A glance at the conditions of the gas supply of London in the early and middle "sixties," when Mr. Phillips came into power, and a view of the same range now, will show at once how much there was to do, how much has been done, and how much missed, in the development of the policy for which he was responsible. He was admittedly the chief unifier and consolidator of the gas supply of London into the big concern having its headquarters in the Horseferry Road. At the time, this policy was the only right and proper means whereby the gas supply of the Metropolis, left as it was in a chaotic condition from the earlier order of competition, could have been adjusted to the modern necessities of the town, without involving the sacrifice of the property of those who had made the industry what it was. The imperative need, for example, of removing such gas-works as the station of the old City of London Gas Company from its central position at Blackfriars, and making sufficient provision outside the town for the increasing demand for gas, was the datum from which the policy of amalgamation took its departure. The paramount consideration of expediency in the public interest dictated this policy; and it would have been imposed upon the Gas Companies occupying the inner Metropolitan districts even though it had not contained within itself any promise of benefit to these undertakings.

If the state of things in this regard which existed in the early sixties had endured another ten years, in all human probability a very different solution would have been found for the London Gas Question. At that period there was no general authority for the local self-government of London. The Corporation only existed for the City, with its one square mile of area; and the Corporation had neither the statesmanship to seek any extension of its territory, nor the prestige to deserve such enlargement at the hands of the Government. Consequently, when the Chartered Company, which possessed some rights and no small influence in the City, undertook to initiate the amalgamation of the gas supply, there was no serious opposition. We can see easily enough the vast benefit that the statutory Gas Companies of Central London derived from this masterly seizure of the "psychological "moment" for the initiation of the policy of amalgamation. A few years later, and there would have been an alternative policy open to be followed by Government. A Gas Commission could have been created, which would

have expropriated the Companies one by one; and the supply at the present moment would have been wholly municipal.

When the policy of amalgamation had once been entered upon, primarily in the interest of the public, it soon began to take on another aspect in the eyes of those who, like Mr. Phillips, could watch it from the inside position where he held the strings. It showed itself capable of benefiting the proprietors of gas stock, and especially of developing to the decided advantage of the amalgamating concern. Meanwhile, in practice, the process of amalgamation went on from three totally distinct centres, at the head of which were as many different sets of administrators who thoroughly well knew what they were about, and were not at all disposed to relinquish in each other's favour the advantage of the power of initiative. These were Mr. Phillips, at the Horseferry Road; Mr. G. Livesey, at the Old Kent Road; and Mr. R. Jones, of the Commercial Gas Company. It is a remarkable illustration of the strength of the "one man" power in such vast and complicated affairs as that of the reconstruction of the whole system of London Gas Supply, that this great operation was carried through practically by these three individuals. What would have happened if the personal influence of any one of these masterful men had been broken by death or any other superior force is, of course, mere matter of conjecture. The important fact is that the leaders of the movement were actually able to keep the business in their own powerful hands throughout the whole of the long and stormy period occupied in its initiation, development, and completion.

The justification of all policies must be sought in their fruits. The Commercial Gas Company's amalgamations, owing to the special circumstances, were soon completed; and as the result of these and the exceptionally favourable statutory conditions secured at just the right moment, the consolidated Commercial position became so assured that the idea of the Company or the public having anything to gain by union with another Company has never been entertained. In short, amalgamation in this case worked itself out to a natural termination. It was the same on the Surrey side. Here it became evident from the early days of the new movement that there existed a financial—it might almost be said a constitutional—distinction between the exclusively Surrey side Companies and those on the north side of the river, which formed a barrier to amalgamation stronger than the physical boundary of the stream. The latter, as a matter of fact, did not exist, as there was one Company—the London—serving a district on each shore. The amalgamating fervour of the Chartered Company did not recognize the existence of any barrier, financial or physical, but sought its gratifications in Surrey as well as in Middlesex. By the time this stage of the course of amalgamation had been reached, however, the original reason which sanctioned the policy had died out in the case of the Chartered, and the reaction had begun to show itself. Amalgamation had now ripened its fruits. All the benefits due to the suppression of superfluous directorates and managements, most of the economies realizable by the unification of control and the concentration of manufacturing stations, were gathered in. Then the other side of the picture appeared. It did not strike competent observers that the Chartered were making such good use of their grand opportunities and powers as should have been effected by competent hands. It was impossible for Mr. Phillips to be everything and do everything. He was a statesman and an administrator; but he never professed to be an engineer, or even an accountant. He flattered himself that he was a good man of business; but this is a point upon which opinions differed.

Be this as it may, the time came when it was not easy to show how the public advantage was to be served by permitting any more districts to fall into the hands of the Horseferry Road administrators. The last amalgamation effected by them—that of the London Gas Company—was confessedly in the interest of The Gaslight and Coke Company; and in order to obtain it, Mr. Phillips was fain to submit to conditions which strained the question of expediency, from his own point of view, to the utmost. The Governor stated on Friday that Mr. Phillips had set his heart upon rounding off his amalgamating performances with the absorption of the South Metropolitan Company; but this was denied him by reason of the internal weakness of the Chartered undertaking already mentioned. So far as the fruits of the Company's amalgamations were concerned, they were then weighed in the balance and found wanting.

The only pertinent question now is whether this long chapter—beginning with brilliant political triumphs, and ending in administrative and commercial weakness—is closed by the action of the Board in placing upon an equality with themselves an expert in gas management, in the person of Mr. Corbet Woodall, of a higher quality than has been associated with the undertaking for many a long day. The members of the Court and the Governor—restive as he is under the fire of the most good-humoured criticism—are worthy, amiable, and substantial gentlemen; but they are not experts. The manner in which on Friday the assembled proprietors turned from the bloodless official statistics and apologies of the Chair to listen to a real live authority and master of his subject, in the person of Mr. George Livesey, showed plainly enough where the actual adminstration stands in the estimation of the world, after all compliments are said. No gas undertaking wants a whole Board of experts, even if these were available; but The Gaslight and Coke Company require a little of this quality in their councils. Time must be given to let it appear whether they have succeeded in acquiring it by an appointment which has given general satisfaction.

We have devoted so much space to the weightier matters of the prospects of The Gaslight and Coke Company, that little remains for discussing the programme of legislation that was foreshadowed by the Governor. The Bill which the Company will promote in Parliament in due course is apparently a measure to which, on its merits, very little exception can be taken. Inasmuch, however, as it will confessedly benefit the Company, it will be strenuously opposed in the public interest; and all the official explanations why Chartered gas is so much dearer than any other supplied in London will have to bear a far different kind of treatment from that heedless optimism which has hitherto been the habit of the Horseferry Road authorities. The castigation administered by Colonel Makins to Dr. Collins, the Chairman of the London County Council, for his clap-trap references to the quality of London gas, was thoroughly well deserved. One would fain think well of the London County Council; but while the Chairman and others so persistently "play to the gallery," it is difficult to hold them in greater respect than is accorded to other demagogues.

One word, in conclusion, upon the Governor's complaint of "JOURNAL" criticism. He accused us of alleging that he "did not always understand his own figures." What we actually wrote, six months ago, was that he is "not "particularly happy in a torrent of figures; usually giving "his audience the impression that while he 'lisps in num-"'bers and the numbers come,' he does not always pre-"serve a lively consciousness of their significance." Since Colonel Makins has challenged our judgment in this regard, we will make an attempt to justify it by citing one instance from his speech on Friday which seems to betray an imperfect appreciation of the meaning of the figures then in question. Unfortunately, moreover, this was not a matter of repeating ratios and quantities supplied to order, but related to a fundamental point of the financial situation of the Company. Speaking of the future, the Governor said: "While their first endeavour would be to postpone "as long as they possibly could any increase in the price of "gas, because such a course might have the effect of check-"ing their sales, the proprietors might rely upon it that "if they saw their dividend in danger at all they would "not hesitate at once to increase the price. Their feeling "was that they could not justify the raising of the price "of gas at the present time, the effect of which would be "merely to swell the reserve fund." Why was it not said in plain terms that the first effect of increasing the price of gas would be, not the saving of the dividend, but its reduction? It is true that the speech went on to allude in metaphorical language to the hope that the Board would "be able to steer their ship through a difficult channel "without having to throw overboard any part of her divi-"dend cargo;" but we have good reason for stating that the whole passage, which was received in gloomy silence by the meeting, did not go far to reassure the proprietors who saw the undivided balance wiped out and the reserve fund cut into in order to once more make good a dividend that had not been earned, and cannot be maintained by the simple expedient suggested by the Chair.

Result of the Plymouth Nuisance Litigation.

In the interests of the gas industry generally, we are glad to be able to record to-day the triumphant deliverance of the Plymouth and Stonehouse Gas Company from the renewed onslaught of the litigious tanner, Mr. W. O. Ward. This has been a most tedious and troublesome affair; but it is impossible to peruse the evidence with care and come to any other view of the matter than that taken by the Official Referee. The facts are soon stated. Shortly after the Gas Company had enlarged their carbonizing plant, a year or two ago, a neighbour who carried on the business of a tanner complained that the increased manufacturing activity of the works had for him the unpleasant concomitant of a largely increased dissemination through the air of dust, smoke, blacks, and other undesirable bye-products, which settled upon his premises in such quantity as to seriously injure his trade processes. After much controversy, the Company agreed to compensate the tanner for this injury; and they consented to an order for the abatement of the nuisance. Apart from the legal aspect of the matter, there is a great deal of technical interest in the story of how the Company went to work to conform to the obligation thus laid upon them. Notwithstanding all their endeavours, the tanner again raised the question of injury, and invoked the aid of the law to punish the Company for creating what he alleged to be a continuing nuisance. It is unnecessary to describe how vexatious proceedings of this kind always are. The Plymouth case is a very perfect illustration of this rule. The Referee had a most difficult and unpleasant duty to discharge, owing to the complication of the issues before him by variations of the character that need not be particularized here. However, all has come right in the end; and we have to congratulate the Company and compliment their advisers upon the result. The gas industry is peculiarly exposed to attack from various quarters; but there is nothing more difficult to meet than an indictment for nuisance. Most litigation of the kind is a lottery, indulgence in which would perhaps be more common but for the gravity of the stakes. Public policy would seem to suggest that the initiative in such proceedings should be entrusted to responsible public authorities.

The Dispute in the Engineering Trade.

The dispute in the engineering trade has not developed in any way pointing to a settlement; and, indeed, nothing of the kind is to be thought of until one side or the other begins to feel the pinch of poverty. Meanwhile, the world has gone round much as though the Amalgamated Society of Engineers did not exist—a circumstance that cannot have been otherwise than a source of mortification to the managers of this arrogant body. A good deal of printed matter has gone forth from various newspaper offices purporting to give the views of the employers and the Trade Unionists upon the causes that have led to the strike and lock-out; but, as usual, the evidence upon this head is very conflicting. The truth appears to be that the men are divided among themselves, while obeying in a general way the directions of their Society leaders. The head-centre ring of officials, represented by Mr. Barnes, the General Secretary, who is understood to be of one mind with Mr. John Burns and Mr. Tom Mann, appear to favour the issue of an eight-hour day with a view to the restriction of the hours of labour and the total abolition of overtime. They do this in order, as they suppose, to create a greater demand for labour, which would have the effect of distributing employment among a larger number of individuals. On the other hand, many of the active members of the A.S.E. do not care a straw how many engineers are needed in the country, so long as they keep in work; but if they can get nine hours' pay for eight hours' work, it will suit them all the better. And they look for the little bit extra for overtime after the eighth instead of the ninth hour. The farce of the physiological aspect of the question, originally brought in by Mr. Barnes, seems to have been given up; and the quarrel is concentrated upon the matter of money. Here the masters have a right to be heard; and they say that the trade as a whole cannot afford the advance. It is, they argue, quite beside the question to contend that certain protected firms and manufacturers of specialities can work upon the system of the 48-hour week without coming to grief. The controlling factor of the problem is the cost of turning out average work—by which we mean that common, every-day work whereby, in the long run, industrial communities live.

Colonel Dyer, the President of the Federation of Employers, has issued a statement on behalf of this organization, in which he traverses the grounds upon which the strikers have rested their case. He shows that the A.S.E. deliberately chose the issue of the 48-hour week as a "popular" one; and he explains in inexorable logic what it means. "What the demand of the Society "means is that the employers shall give their workmen "six weeks' additional holiday every year, and full wages "for it. . . . It means that during the six weeks the "employer shall not only pay wages for work which is "not performed, but shall lose all the benefit of the costly "machinery forming his stock-in-trade, and shall continue "to pay his rent, his rates, his taxes, and all other fixed "charges, just as though his works were in full operation." Does this mean nothing at all—no increase in the cost of production? The A.S.E. asserts that it does not—that men can produce as much, if not more, in eight hours as in nine. This has not been proved, with regard to men employed in strictly mechanical labour. But even supposing it is true of the man, what about the machine with which he is usually associated in mechanical production? A machine will turn out as much work in the same time in Hamburg as in London; and if the man to attend upon it in the former city earns 24s. for 59½ hours' work, as compared with the London man's 38s. for only 48 hours' work, it is tolerably clear that the Hamburg employer will have a great pull over his London competitor for an enormous range of business. Hence, Colonel Dyer declares, the Federated Employers must fight this monstrous claim of the A.S.E. to the last, regardless of what may be done by a minority of "fancy" shops. The burden of Rudyard Kipling's ballad of the "little tramp cargo boats" applies to the engineering trade at large. The majority of employers must get such work as they can for their yards, at whatever prices may be ruling. The men do not know anything about the conditions of the trade, in regard to the making of profit. Nobody wants them to enter into employment as fitters or turners, or anything else, if they do not like the terms upon which such work can be found; but the employers must be the best judges of what these terms shall be.

WATER AND SANITARY AFFAIRS.

The Queen's Speech on the prorogation of Parliament, as at the opening of the recent session, contained an allusion to the subject of the Metropolitan Water Supply. On the former occasion, there was the promise of a Bill "to improve "the arrangements for water supply in this Metropolis;" while last Friday there was the expression of Royal satisfaction at the steps taken by Parliament "to protect the "interests of the consumers of water in the Metropolis." The considerations by which the Government have been guided in dealing with this question were explained in a very impressive speech delivered by Lord James of Hereford on the motion for the second reading of the Metropolitan Water Companies Bill at the commencement of last week. By a strange anomaly in the course of events, it would appear that it is to the action of the London County Council that we are indebted for the appointment of the Royal Commission on Metropolitan Water Supply. The Government might have revived the Water Board Bill of 1896; but when they came to reconsider the matter, they found, as Lord James expresses it, "that much "had occurred during the recess." The County Council had been very busy, and had make certain provisional, though invalid, agreements with the authorities of the outer areas, of a character so advantageous to the latter, "that they would never be likely to oppose any Bill the "London County Council would promote for the purchase "of the undertakings of the Water Companies." This alliance being formed, where was the Metropolitan ratepayer? Clearly he was left out in the cold, and had no one to protect him, unless the Government could interfere on his behalf. The proposed terms of purchase might be never so damaging to the Water Companies, but they could not be just to the London ratepayer. He was to be sacrificed, so that the Council might, with the connivance of the outer authorities, oust the Companies from their position.

Lord James did not put the case so plainly as this, but in diplomatic language he stated the equivalent; and the subject is worthy the study of the Metropolitan ratepayer, as showing how his interests are held subordinate to the aggrandisement of the County Council. We also see how artfully the Council tried to circumvent the Government, and how cleverly they succeeded in spreading a net for their own feet. Their Purchase Bills were rejected by a decisive majority last March; and the Royal Commission was appointed, with instructions to investigate matters which not even a Parliamentary Committee could go into. Public interests are thus safeguarded, and the question will be put upon a broad and proper basis.

That by introducing a Royal Commission the Government have "hung up" the Water Question, is an utterly groundless charge. Inquiry is wanted, of such a nature as the County Council may not desire, and differing from any hitherto attempted. If the matter is to be understood, the most direct method of getting at the root of it is now to be employed. Moreover, as signified by the Royal Speech which closed the session, the Metropolitan Water Companies Bill has passed into law; and in proof that the Government mean business, an amendment introduced in Committee by Lord James brings the Act into operation two months sooner than was originally proposed. As early as three weeks hence, or just a day farther on, the water consumer will be able to take his complaints, if he should have any, before the Railway and Canal Commissioners, who will be armed with ample powers to redress any wrong under which he may be proved to have laboured. The Local Authority can also interpose to aid the consumer. A very stringent amendment, due like the other to Lord James, gives full power to the Commissioners to award damages to the complainant when any complaint is substantiated respecting the quantity or quality of the water supplied for domestic purposes. In the face of this sweeping provision, the petty amendment proposed by Lord Tweedmouth for a deduction from the water-rate was inevitably negatived. Parliament has undoubtedly done its best to protect the water consumer; and if we hear nothing about the new Act, it will be because the consumer has no valid ground of complaint. But the statute sets an important precedent in extending the operation of the law to the whole water area. As a further incident in the water legislation of the year, affecting the Metropolis, we may mention the passing of the Southwark and Vauxhall Bill; Mr. Stuart expressing his satisfaction with regard to the Lords' amendments. But he still demurred to the obligation resting on the Company to bring in a Bill next session to make their altered position permanent. The permanent arrangement will consist in securing an adequate supply of water for the district. Mr. Stuart wants to see a "comprehensive "measure;" and if he will but wait a little while, his wish will probably be granted, though even then he may want something else. On the whole, Parliament has done well with the Metropolitan Water Question during the session which has just terminated.

PERSONAL.

Mr. T. RIDLEY has been selected to succeed his father (the late Alderman Ridley) on the Board of the Bury St. Edmunds Gas Company.

As will be seen by the notice of the report and accounts of the Brentford Gas Company for the past half year which appears in another column, certain changes have been made in the management of the undertaking in consequence of the death of Mr. J. Orwell Phillips, who was one of the Directors. The vacancy upon the Board has been filled by the election of Mr. FRANK MORRIS, M.Inst.C.E., who has for some years filled the position of Chief Engineer of the Company; and Mr. Morris will be succeeded by Mr. J. HUSBAND, who has had charge of the Brentford and Southall works, and has therefore borne a large share of the responsibility attending the introduction and successful working of the inclined system of retorts in use by the Company.

The Award in the Ashford Gas-Works Arbitration.—Mr. Shiress Will, Q.C., has made his award in the above arbitration, the proceedings in which were reported last week. He fixes the amount of maintainable profit at £1420, which at 24 years' purchase comes to £34,080. The Council take over the mortgage and debenture debts of the Company, amounting to £7800; and another £2400 will be required for stock.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 311.)

UPON the reopening of the Stock Exchange after the holidays, it was at once apparent that the favourable tendency which had shown itself at the close had only been slumbering, and had not died completely away. Still, business at first was rather inactive, and indeed at no time during the week did it rise to any degree of animation, owing, in some measure, to the intense heat of the weather. Prices pretty well all round gained some points—Americans and South Africans being conspicuous. But the full measure of advance was scarcely maintained to the end; a disposition to realize profits manifesting itself as the week went on. Business in Gas was quite up to the mark, considering all the circumstances adverse to activity; and the general tone was steady. But while certain quotations have made moderate advances, the list is not free from some retrograde movements; but, on the whole, the gains outweigh the losses. In Gaslights, the "A" was pretty active, and, though put down at the start, was inclined to harden a little afterwards—the mark rising from 313⅜ at the opening on Tuesday to 317 on Friday; but the last bargain on Saturday was at 315. Very little was done in the secured issues; but they were stronger, both debenture and preference. South Metropolitan was quiet and unchanged. A little was done in Commercials; a demand for the debenture stock being noticeable. Business in the Suburban and Provincial Companies was very quiet; and the only move was a rise in the value of Brentford debenture. Among the Continental group, Imperial was fairly active and steady at first; but it afterwards drooped, and the price fell. The 4 per cent. debentures, however, were better. Nothing calling for remark occurred to affect any of the rest. The quotation of Buenos Ayres debenture is struck out of the list pending conversion. Business in Water was fair; and prices were steady, and almost wholly unchanged. The Kent Company meet tomorrow to declare a dividend at the rate of 13 per cent., as compared with last year's 12 per cent.

The daily operations were: Business opened fairly well in Gas on Tuesday, though quotations were lower. Gaslight "A" fell 1; and Imperial Continental 2; but Gaslight 6 per cent. debenture rose 2. Wednesday was quieter; and the only moves were a rise of 1 in Gaslight "C," "D," and "E;" and 2 in ditto "J." Thursday's operations were chiefly in Gaslight "A," which advanced 1. Brentford debenture rose 3. In Water, West Middlesex debenture advanced 1. Business became rather quieter on Friday. Gaslight "A" was firmer; but Imperial Continental fell 2. Saturday was extremely quiet; and quotations closed without further variation.

ELECTRIC LIGHTING MEMORANDA.

A New Electrical Speculation—The Uses of Advertisement—What is the Marconi Invention?

WHEN, a few weeks ago, we drew attention in this column to the new sensation which was being manufactured over the wireless telegraph system associated with the name of Signor Marconi, there was no indication that any financial considerations lay behind the fuss that Mr. W. H. Preece was making about the experimental result of Marconi's methods. As we were able to explain at the time, through the assistance of our electrical contemporaries, Marconi's success, such as it was, had been brought about by his skilful adaptation to the purpose he had in view of certain known principles and physical phenomena. How much of all the necessary paraphernalia was Marconi's, and how much belonged to other people or was common property, we were not curious to inquire. The world is so very old, and so many things have been done and said in it by such a crowd of people, that it is usually a futile as well as a thankless task, when one hears of something that has the air of being fresh, to ask whether anything like it has ever been heard of before. It is not only the confirmed story-teller who has reason to dread the whispered word "chestnut" from some member of his audience. If everybody had a good memory, there would be little story-telling, and almost as little invention, in the mechanical sense. Thus, when we heard of what Marconi had been doing, on the authority of Mr. Preece, and when the electrical journals objected that there was nothing so very new in the elements of Marconi's system, we regarded the subject with mixed feelings. On the face of it, there was something done which had never been done so well, or in the same degree, before. On the other hand, the whole thing was very much a question of degree to those who knew what had been accomplished in the same line.

If it was a question of advertisement only, or mainly, Marconi fell into the right hands when he foregathered with Mr. Preece. It has since appeared, however, that somebody has hastened to turn to financial advantage the splendid semi-official advertisement given to Marconi by Mr. Preece, and a Wireless Telegraph and Signal Company, Limited, has been duly registered, with a capital of £100,000, for the purpose of acquiring from "Signor Guglielmo Marconi certain letters patent." Of course! How

stupid of us not to have understood from the first that, as in the case of all matters electrical, the trail of the Stock Exchange serpent was sure to be drawn over the supposed electrical novelty. Our contemporary the "Electrician" has very properly undertaken to stop the threatened mischief before it can go very far. The men who are pulling the wires in this speculation are going to work in the manner that recalls the best efforts of Baron Grant and certain of the other notorious masters of the art of company promotion whose methods have from time to time engaged the attention of Her Majesty's Judges. A constant stream of personal paragraphs and articles about Signor Marconi and his wireless telegraph has been trickling through the newspapers for weeks. How Marconi saw, or did not see, the German Emperor about his marvellous invention; how old, or rather how young, is this youngest aspirant to the mantle of Edison; what he was reared upon, and who was his instructor in science—this, and plenty more like it, has been in all the newspapers. And now, naturally, the British Public, being sufficiently ground-baited, are to have an opportunity of taking a substantial interest in the Marconi system. This is all quite right and proper, as the "Electrician" admits, "since science is in these days nothing if not a mode of money-making."

At the same time, when science goes into the Money Market, like law and genius and most other things in this world, the natural question occurs of how much it is worth. In the particular instance of the Marconi system, what is it that the inventor has to sell? Inasmuch as the system involves the application of Hertzian waves, themselves foreshadowed by Maxwell's fundamental equations, there can be no property in the principle. "Now the general principles underlying Signor Marconi's apparatus are well known, so that there can scarcely be anything in the nature of a master-patent. And much the same may be said of all the component parts of his radiator—which is admittedly Righi's—and of his receiver, which is of the Branly-Lodge pattern. Of course, a novel combination of old 'instrumentalities' may be as commercially valuable as a master-patent, if not more so, provided the particular combination protected is so far superior to all other possible ones that, practically speaking, it holds the field." In the opinion of the "Electrician," which is clearly well founded, "Signor Marconi could only defend with any reasonable chance of success a patent of this latter kind. Hence, intending investors in a company owning the Marconi patents would do well to make sure that expert opinion supports the contention that the particular devices proposed to be employed far transcend all others in range, reliability, and ease of manipulation." This is, of course, possible; but assuming it to be assured upon the highest authority, there yet remains the still greater question of the good of it all. "What commercial use is going to be made of wireless telegraphy? So long as it remains in its present pupal stage of development, its sphere of usefulness must obviously be an exceedingly limited one. Of course, it may develop into something very different, in which event, provided valid patents are taken out and shrewd business men are at the helm, the original shareholders may revel in gold without going to far-distant Klondike." This is the way of most things electrical. They are always going to make people rich "beyond the dreams of avarice;" and the public rarely hear of an advance of electrical science in any direction without being adjured in the next breath to "be in time"—with applications for shares—because the great electrical triumph is "just going to begin." It is getting more than a little stale, this beating of the big electrical drum; and one is astonished that respectable electricians are not ashamed of it.

FIRST PROCEEDINGS UNDER THE CONCILIATION (TRADE DISPUTES) ACT.

An interesting little Blue Book has been issued, being the First Report by the Board of Trade of Proceedings under the Conciliation (Trade Disputes) Act, 1896. Under this Act, the Board are from time to time to present a report to Parliament of their proceedings; and it has been thought desirable to record the Board's experience of the working of the Act without waiting for the completion of twelve full months from its passing. It is not difficult to divine the motives that have actuated the heads of the Department in thus anticipating this part of their duty. People have been asking what the Board of Trade can have been about to let the present dispute in the engineering trade reach such formidable dimensions; and Sir Courtenay Boyle has taken this means of reminding the public that "the administration of an Act so largely dependent for its success upon the actions of persons other than the officers of the Department must be tentative; and it is far too soon yet to judge of its full influence on the prevention and settlement of trade disputes." It is further observed that the fact of 31 applications for the assistance of the Department having been made in about ten months indicates a willingness to rely upon the good offices of the Department in conducting negotiations which is of very considerable promise for the future. Sir Courtenay Boyle declares that the experience already gained in working the Act clearly establishes, in his opinion, the important fact that when the parties to an industrial dispute can be brought together, "great benefit follows from the presence of an impartial person able to mediate, to prevent the effect of personal asperities, to make suggestions, and to facilitate concessions." This is probably a just view; but there is a manifest gap between the origination of a dispute and the first stage at which the good offices of the Department come into play, which affords ample room for the ravages of the worst kind of strike—the strike "for a principle."

Coming now to what has actually been done under the Act, the Commissioner for Labour submits a detailed statement showing how far the Department has taken action under the new statutory powers. From the passing of the Act (Aug. 7, 1896) up to the end of June, there occurred 35 cases in which action by the Board of Trade was taken or invited under the section of the Conciliation Act relating to the official composure of actual or threatened differences. In 31 cases, the Department was applied to; and in the remaining four, action was taken without formal invitation from either party. The majority of the applications—16 in number—came from workmen. The principal disputes appear to have been small affairs, of local importance; but in the most conspicuous instance of the Penrhyn Quarry trouble failure is recorded—the official reason given being that "one of the parties was unwilling to accept Board of Trade mediation." It is not to be forgotten, however, that the proceedings of the Department in regard to this dispute were sharply criticized at the time by Lord Penrhyn.

The engineers' dispute on the Clyde during last August is summarized very fairly; and an instructive account is given of a bootless strike of spring makers at West Bromwich, in which the Gas Workers' and General Labourers' Union figures to its disadvantage. Upon general principles, one would hardly look for the action of this Union under the head "Spring Makers at West Bromwich;" but a further examination of the passage reveals interesting proof of the catholicity of this society. On June 18 of last year, the spring makers in the employ of a West Bromwich firm, to the number of 134, all told, came out on strike, after a week's notice, to enforce a demand for a general advance in wages of 12½ per cent. for the men, and various amounts for the youths. "The men belonged to the Gas Workers' and General Labourers' Union. The employer, however, declined to treat with this Union; and no negotiations took place between the parties." More than three months later, when the places of the men had been partly filled up, the Secretary of the Union applied for the intervention of the Board of Trade. The Department lost no time in responding to the invitation, and sent a representative to the spot to inquire into the matter. "He had interviews with the firm, the District Secretary of the Union, the Strike Committee, and the general body of the strikers, with the result that an arrangement was arrived at for the men to return to work on the 1st of October, at the old rate of wages, so far as existing vacancies permitted. The firm agreed to find places for the men on strike so far as practicable, with the exception of certain individuals whom they refused to re-employ." The action of the Gas Workers was evidently not particularly well advised in this instance.

The next strike story of special interest for our readers is that of the Hull engineering Trade Unionists, who came out on the 12th of August last against the employment of an ordinary machine worker upon a certain new milling-machine. There were other complications; and eventually the dispute was settled under the auspices of the Board of Trade, which left the question of principle open—to crop up again later at Pallion. This incident shows the uselessness of the best-meant attempts to blink the existence of radical incompatibilities of industrial politics for the sake of patching up a temporary local peace. The story of the pacification of the trouble on the London and North-Western Railway at the end of the year is one of the construction of a "golden bridge" for those who were anxious to have constructed for them such means of retreat from an impossible position. This was an occasion when the Company struck first, while the Trade Unionists in the service were as yet only in the stage of talking of the eventuality of a strike. On Dec. 10, Mr. Harford, the General Secretary of the Amalgamated Society of Railway Servants, warned the Board of Trade that a strike was "imminent." Next day he repudiated the idea that a strike was intended; but he admitted that the London and North-Western Railway Company had good ground for assuming that there was to have been a strike. "Under these circumstances," the high contending parties had little difficulty in coming to an understanding.

One more narrative is in relation to the action of the Gas Workers' and General Labourers' Union—not in regard to gas making. On March 24, the ironworkers employed by the Bestwood Coal and Iron Company, to the number of 183, ceased work. They were members of this Union. The immediate grievance was the discharge of eleven men for alleged neglect of duty. Subsequently the Manager agreed to reinstate all but three of these men, whom he declined to re-employ. For some time previously, an agitation had been going on among the men for certain improvements in the conditions of their employment; and within a few days of the commencement of the strike, the men formulated their demands upon the management. It was the familiar trick of going out upon one issue, and wanting a number of other grievances settled before going in again. The Company refused point-blank to discuss any questions with the strikers so long as the Union insisted on the reinstatement of the discharged men. On April 14, the Secretary of the Union applied for the intervention of the

Nottingham Trades Council, and a deputation of this body had interviews with the Manager and the men. As a result of these negotiations, an agreement was arrived at that the three men in question should remain discharged, the rest of them to resume work on April 26. The other points in the strikers' manifesto were to be held over for adjudication by an arbitrator to be appointed by the Board of Trade. There was no hurry about putting the latter part of the settlement into operation. It was not until June 21 that the Secretary of the Union applied to the Board of Trade for the appointment of an arbitrator in accordance with the terms of this agreement; and on July 9 the Department appointed Sir David Dale, Bart.—not, of course, with the smallest hint that by this time the questions in the reference had ceased to have much more than an academic interest. Again the Gas Workers' and General Labourers' Union would not appear to have come very well out of the trouble it had precipitated.

The report concludes with a couple of appendices, which is an exceptionally modest allowance for a publication of this class. Taken as a whole, the matter conveys the impression that the Department are somewhat nervously anxious for it to be considered outside that the Act of last year has already proved successful in actual working; while the facts scarcely support the official view. The Labour Department of the Board of Trade was packed with a crowd of professional agitators and Trade Union officials when it was started; and it is easy to understand that the Board would far rather utilize these functionaries in composing industrial disputes than see them back in their old employment of fomenting them and increasing the powers of Trade Unions. At the same time, it must be obvious even to the official mind that the case for the utility of the Conciliation (Trade Disputes) Act up to date is rather a weak one, after all is said.

NOTES.

The Mechanical Stacking of Coke.

Reference has on several occasions been made to the system devised by M. de Brouwer, of Bruges, for the mechanical quenching and removal of coke from the retort-house. It may be remembered that the hot coke, on being drawn from the retorts, falls into a water-tight channel, and is conveyed away by an arrangement of endless chains and cross-bars carried by wheels. Outside the house, the channel rises at an angle of about 30°; but it can be raised to any height, and continued in any direction. It seems, from a short communication made by M. Rouget to the Société Technique du Gaz en France at their last meeting, that the Company who are working M. de Brouwer's patent in France have somewhat extended his idea at the Fontainebleau Gas-Works by prolonging the channel so that the coke is conveyed up a gradient of 25° to a height of 13 feet, and then falls into a long horizontal channel, at the end of which is the coke-breaker, where it arrives without having been touched from the time of leaving the retorts. If it is desired simply to stack the coke, the conveyors at the bottom of the channel can be so regulated that the lumps always fall on the top of the heap already formed, so that there will be a drop of only about 3 feet. This is an important point, as with the greater fall there would necessarily be a larger production of breeze.

The Coal-Tar Colour Industry in England.

During the recent meeting of the Society of Chemical Industry in Manchester, a number of members paid a visit to the works of Messrs. Levinstein, Limited, who are making a strong effort to recover for England the trade in coal-tar colours for the time being wrested from us by Germany. The Company make a speciality of naphthalene derivatives, of which they are the largest manufacturers in Europe. The principal difficulty in the coal-tar colour trade is stated by Mr. Levinstein to be not in the manufacture of the colours themselves, which is simple enough, but the procuring in sufficient purity of the secondary products from which the colours are derived. Thus it is necessary to highly rectify the naphthalene used in this manufacture, in which from 400,000 lbs. to 500,000 lbs. of the purified salt is treated per month in this establishment. From naphthalene the Levinstein Company make nitro-naphthalene, which is subsequently reduced by the agency of hydrogen to form naphthylamine. In one of the Levinstein processes, the retorts are worked under a pressure of one ton to the square inch. In illustration of the progress of chemical industry, it was stated that, despite the difficulties of preparation, the consumers of this class of products are demanding a higher standard of purity every year, though much of the commodities sold in what is almost a state of chemical purity sells for fewer pence than it commanded shillings a few years ago. The visitors were shown the actual manufacture of naphthol scarlet—a colouring substance which has now almost entirely superseded cochineal. Mr. Levinstein, in a short address, observed that in throwing open the works his object had been to show those interested in the subject that the coal-tar colour industry not only exists, but is expanding in this country. While in the quantity and variety of products manufactured from coal tar we are behind Germany, we are gaining ground, and are actually occupying a very creditable position as regards the manufacture of the intermediary products from which the colours are prepared.

TECHNICAL RECORD.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

The Papers and Discussions at the Annual Meeting at Ayr.

In the "JOURNAL" last week we gave a report of the general business at the above meeting, and the address of the President (Mr. A. Bell, of Dalkeith). We now publish the papers, with the discussions thereon.

Mr. HUBERT POOLEY (Dunfermline) read the first paper, entitled—

WAYS AND MEANS OF INCREASING GAS CONSUMPTION.

To a certain extent a paper describing ways and means of increasing gas consumption must recapitulate what has already been extensively gone over before more than one of the Gas Associations of Great Britain. Indeed, it is becoming increasingly difficult to find any new ground on which to build up the fabric of a paper. This must be my excuse to you to-day in putting before you a few of the plans we have adopted at Dunfermline for the further development of our business.

I purpose treating this subject in two ways—first, with reference to the relation existing between manufacture and consumption, and consequently the relative increase of the latter; and, secondly, with regard to the creation of an additional demand for gas.

The first thing to examine into is the relation between consumption and manufacture, and, of course, relatively to increase the former. In calling your attention to my first table, you will observe that our working in the year ending the 31st of May, 1893, resulted in a very heavy loss by leakage, amounting to 15·27 per cent., or 10,565,700 cubic feet on a total manufacture of 69,180,000 cubic feet of gas. The next year the actual leakage was slightly less (10,498,200 cubic feet), although during that year we had made very extensive alterations on our largest trunk mains, substituting 12-inch and 10-inch mains for 8-inch and 4-inch ones—the work occupying the whole of the period from May to September. But while there was a slight actual decrease the percentage of loss was much higher; being 17·60 per cent.

TABLE I.

—	Gas Manufactured.	Gas Accounted for.	Leakage.	Per Cent. Lost.	Ratio between Make and Sale
Year ending—					
May 31, 1893 . .	69,180,000	58,614,300	10,565,700	15·27	847/1000
,, 1894 . .	69,634,000	49,135,800	10,498,200	17·60	824/1000
,, 1895 . .	62,429,000	55,453,100	6,975,900	11·17	888/1000
,, 1896 . .	65,187,100	59,588,600	5,597,400	8·59	914/1000
May 15, 1897*. .	63,587,100	59,130,100	4,457,000	7·09	930/1000

*Owing to the transfer of the undertaking to the Corporation of Dunfermline, the year ended 16 days earlier than before; and, since the year preceding contained 29 days in February, the period under consideration was 17 days shorter than the previous year, or equal to 1,100,000 cubic feet of sale.

At this point I should explain that Dunfermline is somewhat peculiarly situated, being almost wholly dependent on the linen industry. You will notice that the manufacture of gas, which has uniformly increased from the year 1828, dropped very seriously in the year 1893-94. This was owing entirely to very severe depression in the damask linen industry, brought about almost entirely by the imposition of the first M'Kinley tariff in the United States. You will further notice that we have only just began to gain ground in consumption over the year 1892-93, while our manufacture still falls short of that year by some 4,000,000 cubic feet per annum. We are, therefore, supplying a larger annual quantity of gas, and this at a very much reduced cost, than in the year 1892-93; the savings here amounting to about 2d. per thousand cubic feet of gas manufactured. You will notice that there was a very great decrease in the leakage in the year ending May 31, 1895. At the commencement of this year we began to manufacture gas at our new works; the old station being entirely closed. The decreased leakage in this year was due, in a very large degree, to the disuse of three gasholders, which were in a wretched state of repair. Indeed, in the winter of 1894-95 I was compelled to discontinue using the outer lift of my largest holder at these works on account of two rents—7 ft. 6 in. and 2 ft. long, respectively—appearing at the water line of the lute. For this reason it was fortunate that there was not the usual demand for gas, as our maximum day's sale in the previous year was 464,000 cubic feet, and our total storage that year was 380,000 cubic feet, which was curtailed by this accident to the extent of nearly 70,000 cubic feet. We should thus have been left with a very small amount of storage room, and this would have been particularly inconvenient, as our manufacturing power was very limited, and, as it was, with our small makes of gas, we frequently were compelled to change purifiers eight times a week during the winter months.

The only cure for leakage is to attend to every reported escape of gas, no matter how trifling it may seem to be, without

delay; and it is only through this, and the careful examination of (and, where necessary, the renewal of) service pipes, that we have succeeded in bringing our leakage down since the year 1894-95. It, perhaps, has not struck all of you before, that even in the case of a small escape of 0·2 cubic foot per hour, it will pay, at a selling price of 3s. 7d. per thousand cubic feet to expend £5 in repairs, if necessary. I think that, except in the case of a district which is honeycombed with underground workings, there is little excuse for any of us having a greater leakage than, say, 6 per cent. Personally, I shall not rest satisfied till I can show considerably better results than this; and I may add that a portion of Dunfermline district is situated above coal workings.

The increase in consumption during the last five years has been so slight that in the early part of the present year my Commissioners requested me to report on the matter, and to suggest the best means for increasing this consumption. This brings me to the second part of my paper, dealing with "The Creation of an Additional Demand for Gas."

The old Gas-light Company had imposed some regulations on those desirous of becoming gas consumers—among them being a rule that all new consumers should pay a deposit in accordance with the number of lights to be burned before a supply of gas should be turned on. This was rigidly enforced, and it is only within the past month that any relaxation has been shown—my new Commissioners having decided to leave the matter to my own discretion. I do not desire, in any way, to belittle the system of demanding deposits from consumers. It is, to my mind, a business consideration which, I think, is not always necessary, especially in the case of a town whose population is practically a stationary one; and where a comparatively small undertaking has been somewhat crippled with such a condition. I feel that in such a case some relaxation should be shown; and I have no doubt that the partial removal of this rule, which was locally considered a great grievance and indignity, will result in the large expansion of our particular business.

I would now like to say that in the face of competition with an increasing number of other illuminants, let us hasten to remove all obstacles which may tend to prevent the full growth of the demand for gas. Where it is possible I would advocate the abolition of all meter-rents.

In examining the latest Parliamentary Returns, dated the 11th of August, 1896, I am surprised to find that out of some 429 company undertakings, manufacturing 77,245,618,489 cubic feet of gas per annum, only some eight provide meters entirely free of charge; their yearly manufacture being 21,526,805,000 cubic feet, inclusive of 20,660,944,000 cubic feet manufactured by The Gaslight and Coke Company alone. Thus, apart from this huge concern, only about 1-65th of the gas manufactured under company *régime* in the United Kingdom is supplied without charge for the measuring instrument. Among corporation undertakings a larger number give meters free, and from the same returns I learn that out of 203 concerns, some 63 make no charge. Looking at our own statistics for the year 1896, out of 246 Scottish concerns, 67 supply meters without cost to the consumer; 40 of these undertakings belong to companies and 27 to the local authorities.

In Dunfermline we have 3921 consumers of all sorts, and, among these a very large proportion consume only a trifling quantity of gas, and they feel that the charging of 1s. 6d. per annum for small meters up to three lights is equivalent to increasing the price to a very marked extent. While to us, and consequently to the consumers as a whole, the taking off of this charge would mean a reduction of 1d. per 1000 cubic feet per annum, to them in many cases it would individually mean a saving of, at least, 6d. per 1000 cubic feet. With us, a step has perhaps been taken in the right direction in supplying free of all cost and of hire meters for use with cookers and gas fires, and also in supplying prepayment meters, with a limited number of fittings where required, at a charge for gas slightly over the current rates. I will, as far as possible, exclude the subject of automatic meters from this paper.

In the year ending May 15, 1897, we had out on hire only 44 gas-cookers; and of these 21 had been connected during the previous three years. At the close of the same year we had some 22 gas-engines taking their supply from us, of which 7 had been fixed between 1893-96. These engines consumed last year 1,729,900 cubic feet of gas, the largest, a 12 nominal horse power engine, being used in the Co-operative Society's bake-house. Although up to the present year I had done everything in my power to foster and improve these two sources of revenue, I had only succeeded to a very limited extent.

The Corporation having become the happy possessors of the undertaking, and the capital naturally having risen from some £63,000 to £100,000, it became necessary to make very strenuous efforts to swell our profits. With this in view, I recommended the Gas Commissioners to introduce a differential rate to be charged for gas used for cooking, heating, and motive power, with special meters supplied and fixed free of cost, and free of rent in the former two cases. (In the case of engines, the consumers provide their own meters.) These suggestions they resolved to carry into effect, and fixed the new differential rate at 2s. 11d. per 1000 cubic feet net, against the ordinary lighting rate of 3s. 7d. per 1000 cubic feet, less discounts of from 2½ to 10 per cent. according to the gas consumption where that consumed exceeded £10 in value. At the same time they resolved to encourage the use of gas among the poorest members of the community, reducing the price to consumers by coin-freed meters from 4s. 7d. to 4s. 2d. per 1000 cubic feet, and giving to these consumers small cookers on loan, fitted free of all cost and without any additional rent. This, to the poor of the town of Dunfermline, is sure to prove a great boon, as their present cooking arrangements are now, for the most part, crude in the extreme.

In making these recommendations to my Committee, I felt sure that the profits on the increased consumption of gas would far more than recoup us for the loss immediately sustained through the introduction of the differential rate. So far, this promises to be the case, even in the present year. Since the announcement was made that gas would be supplied at a cheaper rate for these purposes, and since the general public understood that these stoves were fitted up entirely at the cost of the Gas Commissioners, a successful gas exhibition was held, which has directly resulted in the letting out on hire of 58 other stoves, and in the sale of several more of the "breakfast cooker" type, and a few gas-fires. I have also certain information that, at least, 7 new gas-engines will be erected, and these of a much larger average size than those already in use. In addition to these, we shall put out some 260 to 300 small stoves for use with coin-freed meters.

We have already fixed some 54 of the cookers on hire; and I find that the average cost of connecting up the new differential meters and the stoves, inclusive of everything, has been 16s. 10d. per stove. Our stove rents are calculated on a 10 per cent. basis from the published list prices; so that, after deducting the discounts allowed by the manufacturers, and adding on this additional cost for fixing up, &c., our stoves will still prove to be a considerable source of revenue.

We have only, as yet, fixed some 15 stoves for use with slot-meters, as we have experienced some difficulty in getting goods forwarded as they have been ordered. The inclusive cost of connecting these up to the existing fittings has only averaged 6s. 6d. per stove.

When all these are fixed and at work we shall have some 362 gas-stoves and 29 gas-engines in the town, in place of 44 cookers and 22 engines in the year 1896-97. Unfortunately, we only had separate meters for 8 of the 44 cookers in use during that year; and the average consumption—23,000 cubic feet per annum—was, perhaps, such a high one that it is hardly fair to take this figure as a basis for calculation. If we take the low figure of 6000 cubic feet per annum as the probable average, and consider the effect on the consumption and profits from the introduction of these new cookers, we shall arrive at the following results:—

Consumption in 44 stoves in the year 1896-7 = 264,000 c. ft.
Profit, with a selling price of 3s. 7d. per 1000 c. ft. = £23 14s. 11d.
Consumption in 102 stoves in the year 1897-8 = 612,000 c. ft.
Profit, with a selling price of 2s. 11d. per 1000 c. ft. = £35 7s. 4d.

And taking the average additional consumption through the slot-meters due to the introduction of 260 small cookers at 3000 cubic feet per annum, the additional consumption by 260 stoves equals 780,000 cubic feet. The gross profit, with a selling price of 4s. 2d. per 1000 cubic feet, is equal to £93 16s. 6d., from which we should deduct £32 10s., being at the rate of 2s. 6d. per stove in lieu of stove rents, leaving a net additional profit of £61 6s. 6d.

The total consumption in the year 1897-98 for cooking purposes should therefore equal 1,392,000 cubic feet; the profits being £96 13s. 10d. The calculated increase in consumption will amount to 1,128,000 cubic feet, the increase in profits being £72 18s. 11d.

Now, turning to gas-engines, in the year 1896-97 there were 22 gas-engines in the town, varying in size from less than ½ nominal horse power to 12 nominal horse power; the average size being 3·27 nominal horse power, and the average consumption being 78,632 cubic feet per engine. Seven new engines have been purchased since the reduction was intimated. Two of these replace smaller engines, and five are entirely new. Three others are at present being negotiated for. But, leaving these latter out of the question, the average size of the new motors is 5·35 nominal horse power; and I have calculated from data and local knowledge that their gross consumption will amount to 1,518,000 cubic feet, approximately, or 216,857 cubic feet per engine per annum. This high average is mainly due to one engine driving refrigerator machinery, and being at work night and day.

I would here submit Table II. [p. 318], showing the consumption of each of the gas-engines at work for the year 1896-97, and the probable annual consumption of those recently bought. In that year, the profits on the gas consumed at 3s. 7d. per 1000 cubic feet, less discounts, amounted to £141 2s. 7d. If my estimate for the first full year's working, including the new engines just ordered, be correct, the profits on the sale of 3,247,900 cubic feet of gas at a net selling price of 2s. 11d. per 1000 cubic feet will be £187 14s.; thus showing an increased profit of £46 11s. 5d. on one year's working. I am hopeful, even after this increase, of getting out some two dozen more gas-engines. So far as power is concerned it has proved a difficult task to expand the business, because coals which are suitable for boiler firing can be purchased anywhere in Dunfermline for less than 6s. per ton.

TABLE II.

Consumer.	Nominal Horse Power of Engine.	Annual Consumption.	Price Paid 1896-7, 3s. 7d., less Discounts.
			£ s. d.
1.—Butcher	less than ½	3,700	0 13 3 (a)
2.— „	½	900	0 3 3
3.— „	½	3,400	0 14 2 (b)
4.—Wholesale grocer	½	3,100	0 10 10½
5.—Cycle repairer	½	7,800	1 7 11½
6.—Smith	1½	4,600	0 16 6 (a)
7.—Printer	1½	382,500	65 2 1 (a)
8.— „	4		
9.—Car proprietor	2	12,600	2 4 0
10.—Co-operative Society	2	900	0 2 11
11.—Baker	3	117,400	20 10 2
12.—Joiner	3	17,200	3 1 7½
13.—Linen manufacturer	3½	159,200	27 16 2½
14.—Baker	3½	125,200	21 17 6
15.—Ironmonger	3½	64,300	11 4 8
16.—Joiner	4	41,200	7 3 11½
17.— „	4	31,300	5 12 1½
18.— „	4	105,500	18 8 7½
19.—Wholesale grocer	4	19,100	3 6 9½
20.—Grain merchant	6	73,900	12 8 3
21.—Co-operative Society	8	93,900	15 2 10
22.— „ „	12	462,200	74 10 7
Total	72	1,729,900	293 8 4
Averages	3 27	78,632	3s. 4·71d.
Total of old engines	72	1,729,900	..
I.—Printer	½	65,000	..
II.—Plumber	3	20,000	..
III.—Printer	4	290,000	..
IV.—Baker	6 (c)	addi'l 60,000	..
V.—Joiner	6	110,000	..
VI.—Icemaker	8	920,000	..
VII.—Joiner	10 (d)	addi'l 53,000	..
Total	100·5	3,247,900	473 13 0
Average	3·78	111,957	2s. 11d.

Remarks.—(*a*) Part of year only. (*b*) At Townhill, price 4s. 2d. per 1000 cubic feet. (*c*) Replacing a 3 nominal horse power engine. (*d*) Replacing a 4 nominal horse power engine.

The best result I have been able to record in Dunfermline was in the case of an 8 nominal horse power engine, which, with a steadily increasing load, repeatedly consumed 3900 cubic feet in 24 hours' work, equal to 20·31 cubic feet of gas per nominal horse power-hour, and as the brake horse power employed probably averaged not less than 12-horse power during the whole period, the consumption of gas per brake horse power-hour equalled about 13·54 cubic feet. This result will be sufficient to explain the reason why it is so difficult to introduce town's gas in Dunfermline for power purposes. It is a poor steam-engine which consumes 8 lbs. of coal per brake horse power-hour, and yet with this large waste of fuel 3·89 brake horse power per hour are obtained for the cost of one penny for coals, as compared with 2·11 brake horse power per hour as obtained with us for one pennyworth of gas. Still, allowing for the lesser attendance which is necessary with gas-engines as compared with steam-engines in small works, where the load is constantly varying, I consider that, with gas at 3s. per 1000 cubic feet, a gas-engine of the most efficient type is the more economical motor.

Discussion.

The PRESIDENT explained that Mr. Pooley was obliged to leave very soon; and there would consequently be very little time for discussion.

Mr. S. STEWART (Greenock) said it was very gratifying to have the younger members coming forward with papers, as it showed that the Association still contained a large amount of vitality. He must congratulate Mr. Pooley upon his very interesting communication. They had tried most of the methods he had mentioned—gas-stoves, gas-engines, and the like—and though he was not prepared to elaborate what they had done in Greenock, still there was not the least doubt that the use of these things caused an increase in gas consumption; and, considering the difficulty they had in fighting the electric light people, he thought they should take every opportunity for improving the consumption of gas. He looked upon Mr. Pooley's paper as highly encouraging; and he should be very glad if some of the younger members, who might have had gas-stoves passing through their hands, would kindly give them their experience with them.

Mr. A. YUILL (Alloa) said he must thank Mr. Pooley for the paper he had given them, and the information it contained. Speaking as a member of the Committee, they had experienced difficulty in getting papers for this year's meeting; and they ought therefore the more to thank Mr. Pooley—he was sure the Committee would do so—for coming forward. One thing which struck him very forcibly, and which reflected great credit on Mr. Pooley, was the table he gave them showing the reduction of his leakage. He thought it was a most important record. In fact, he did not recollect having ever seen the equal of it—a reduction of so much as 10 per cent. in three years. Mr. Pooley mentioned the gasholder as having been put right; but he thought he must have paid considerable attention to his pipes as well. It also struck him that, when Mr. Pooley spoke of a leakage of 0·2 cubic foot per hour justifying an expenditure of £5 upon repairs, he meant the interest upon a capital outlay of £5. On the whole year, the loss of gas would be about 1758 cubic feet, which, at 3s. 7d. per 1000 cubic feet, would not come to anything near £5. In places situated like Dunfermline, no doubt dull trade did interfere seriously with the proper management of the works—more particularly when they found that the consumption went down, as it did between the years 1893 and 1894, to the extent of 10 millions. That being the case, he thought it lay with them, as gas managers, to take means to try to get their gas consumption equalized by other means—such as cooking, heating, and motive power. The cheaper the gas became, the more it would be utilized for these purposes. He had to thank Mr. Pooley for bringing the matter before them. He had no doubt that, when they had time to consider it, they would look upon it as a worthy contribution to the Association.

Mr. D. VASS (Portobello) asked, with reference to the increase in the consumption of gas during the day, whether it was not also necessary to raise the pressure, and whether, in this event, they would not also have to face an increase of leakage. Mr. Pooley had proved a decrease of leakage in his case; but this might have been obtained in another way than he thought. If he had gone on, might there not have been an increase of leakage? This raised the question of giving benefit to day consumers. It was just a question of policy whether they should incur any loss by giving cheaper gas for day consumption. Mr. Pooley mentioned some figures with reference to the profits when selling at the lower price. He supposed this referred to the profits over and above the cost of manufacture, without taking into account any standing charges against the ordinary working. It must be a differential rate as between 2s. 11d. per 1000 cubic feet and the actual cost of manufacture.

The PRESIDENT said he was afraid he would have to call upon Mr. Pooley, because he must go away. Mr. Pooley had given them a record of his work on which he was to be congratulated. Though Mr. Pooley left, they could go on with the discussion.

Mr. POOLEY said he was much obliged to the members for the way they had received his paper. In reply to Mr. Yuill, he would point out that the value of the 1758 cubic feet per annum was 6s. 3d., which was equal to 6 per cent. on a sum of more than £5. In answer to Mr. Vass, he would say that the increase of pressure which would be necessary to meet an increased demand for day consumption could not make a very great difference in the leakage, if the pipes were in proper order; and his costs were all taken to the consumer's meter, but did not include interest charges.

The PRESIDENT thought they should record a very hearty vote of thanks to Mr. Pooley for his paper. Of course, it was simply a record of his working. It was a credit to him; and, as Mr. Stewart had said, it was an example to their younger brethren. Their experiences varied with circumstances. This was Mr. Pooley's experience; and let them all give theirs.

Mr. J. M'GILCHRIST (Dumbarton) said he had not the pleasure of hearing Mr. Pooley read his paper; but during the short time he had been sitting there, he had heard differential rates referred to. He was not in favour of them. He thought they should give the consumer for lighting purposes, who was really their most important customer, the gas at the lowest possible rate at which they could sell it; and he believed it would be further in the interests of gas companies and gas corporations if they would act entirely on the lines of supplying gas at the lowest price possible. He also noticed that Mr. Pooley was departing from the rule which the Gas Company had of requiring a deposit from each consumer. He should think that Mr. Pooley, serving a Corporation, was putting himself in a very awkward position if he was to say who was to deposit and who was not. In his opinion, a Corporation official should either recommend that all the consumers should be freed of the deposits, or, if deposits were required, that they should be taken from everyone. He knew that the Provost of Dumbarton had to make a deposit in the same way as the smallest consumer living in a single apartment; and there was no great hardship in this, because the consumers got 5 per cent. on the deposit. People now came into the gas office and asked what the deposit was to be; and when the clerk said £1, they would answer: "Make it £2." But they took care not to require a deposit of more than the consumption would amount to in four winter months. The result was that at the end of the year they had practically no bad debts. The fact was that they sometimes had a profit, because occasionally consumers left the town thinking they were indebted to the Gas Corporation; whereas if they had called at the office, they would have learned that it was the other way about.

Mr. A. MACPHERSON (Kirkcaldy) was sorry that he, too, did not hear the paper read; but the thing which struck his eye was the remarkable reduction of leakage. This, of course, might be accounted for by the fact that Mr. Pooley changed from the old to the new works; and it was quite possible that the meter in the old works might not have been registering accurately. He must say that a reduction of 10 per cent. was most remarkable. They were all very glad to get a reduction of even ½ per cent. in a year; and so this was a most extra-

ordinary reduction. Mr. Pooley said truly that the only cure for leakage was to have it stopped. There was no gas manager who would willingly allow leakage to go on; but the difficulty was to know where it was. Mr. Pooley said that leaks were often the result of underground workings. In the case of Kirkcaldy, the whole town was built over workings; and they occasionally had subsidences which carried away the mains. Then they had to dig pits in order to get at the source of the leakage; and it was no very easy matter to stop losses of gas in such instances. They knew that Mr. Pooley had a telescoped holder which leaked, and they also knew that Mr. Mackenzie, his predecessor, was a most careful man—a man who would not allow even a fraction of a foot of gas to escape if he could help it. Consequently, he should be inclined to attribute the saving of 10 per cent. largely to a difference in the registration of the meters. In regard to the encouragement of the consumption by differential rates, like Mr. M'Gilchrist, he did not agree with that at all. He held his first duty to be to the consumers of gas for lighting. They were their chief support; and he did not think they had any right to give a supply of gas at a lower rate for cooking or motive power than they charged to those for whom the works were primarily established. It was certainly a very desirable thing to encourage the consumption of gas; but he thought they could all encourage it, by means of cooking-stoves and gas-engines, without reducing the price of gas consumed in them, or giving the users of them a premium in the shape of fitting them up free of charge. He thought it would take a very considerable amount of increase to enable them to do that; and the outlay upon it came, of course, as a charge against others who employed gas for lighting purposes. This was a thing which he thought they had no right to do. It was very gratifying to see that Mr. Pooley had been able to increase the number of gas-engines and cooking-stoves; and he hoped he would be able to continue doing so. But there was not the least doubt that, where coal was cheap, they had a great difficulty in getting people to take these appliances. He knew that in his own place they had not the number in use which they ought to have, for the simple reason that they had coal pits at the back of the town, and the people, getting coal cheap, would not go in for the use of gas for cooking or motive power. The prejudice against gas-cookers had now almost died out; and this itself might be a great help. If they had a few of the hot summers they used to have, that also, he believed, would be a considerable help, because gas-cookers, in such cases, added greatly to the comfort of the household.

Mr. W. Smith (Ayr) said he also was sorry that he did not hear the paper read; but from what discussion had passed, he could learn that it had been principally about the increase of the sale of gas by hiring gas-stoves and gas-engines. His experience was that, so far as increasing the sale of gas by this means was concerned, it was not altogether profitable. They might take a horse to the water, but they could not make him drink. The great thing against gas-stoves was that in almost every house the hot-water system was connected with the kitchen grate. People constantly required hot water; and therefore they must have fires in their kitchen ranges to provide it. They said very rightly: "What is the use of our having a gas-stove, when we must have a fire too?" He found that the people who used gas-stoves were principally those who did the cooking themselves—those who had no servants, like boarding-house keepers. To them the economy was such that it could not be expressed in pounds, shillings, and pence, because there was a saving of the wear and tear of the body in the case of those who kept boarders, and who had to cook continually from morning till night. They had in Ayr, he thought, about two dozen gas-stoves out on hire; and he found that, at term time, when the people were flitting, they very often did not care to take the stove with them, or to hire another for their new house, and the tenant who went into the old house did not want a stove. Thus it was returned on their hands. As to gas-engines, he certainly thought there was no power which was cleaner, better, or readier than that which was derived from them. They had at work in Ayr about 200 gas-engines, of from 2 to about 12 horse power; and they found that they had a great increase in the sale of gas from them, and that the users were perfectly satisfied that they could not get anything like them—they were so economical. In some cases, if they were using steam, the wages of an attendant would be as much as the cost of the gas consumed by the engine—averaging about £1 per week. He found one of the best ways of increasing the sale of gas was to give free to all the consumers burners suitable for the quality of the gas supplied. Supposing the accounts had been a little heavier, the complaints had been less. Another way of increasing the sale of gas was to have some supervision over plumbers. Really some of the plumbing work which was done was shameful, and not to be accepted at all. He did not know that even architects were free from blame in this matter, because, while they might be very particular in detailing in their specifications all about sanitation and water supply, they said very little as to how gas-pipes were to be laid through the houses. In Ayr, he was glad to say, they had a good technical school for plumbers, which obtained a grant of about £10. This was a useful institution; but in technical schools, as a rule, all sorts of subjects were taught except those relating to gas. He thought architects should be careful, when preparing plans, to specify the sizes of the gas-pipes.

Mr. J. Ireland (Tayport) said he had never opened his mouth in the Association before; but he wished to say that by increasing the pressure they had a much greater loss by leakage. He had recently used a meter to measure his day consumption; and he found that by increasing the pressure from 5-10ths to 10-10ths, they had actually double the quantity of gas going through the meter. He knew that this was not according to theory; but it was the actual fact. By increasing the pressure and not getting sufficient outlet by means of stoves and the like, it was a loss to him.

The President: Did you have the meter tested when you found this discrepancy?

Mr. Ireland: I had it repaired; but still it was a loss.

Mr. S. Waddell (Broughty Ferry) pointed out that, if a lighted burner could not get a sufficient supply with a pressure of 5-10ths, an atmospheric burner required 10-10ths; and he should like to know how the ordinary pressure would serve them both, with an increased consumption during the day. Up to the point of their having a great deal of day consumption, he should expect it would really be a loss, through increased pressure.

Mr. A. MacPherson remarked that what Mr. Ireland said was that he had a pressure of 5-10ths at the inlet; and the 10-10ths was also at the inlet. Suppose it took 2-10ths to drive the meter, they knew that they required four times the pressure to double the volume of gas delivered; so that Mr. Ireland was approaching the subject rightly.

Mr. A. Wilson (Dawsholm) said that his department had more to do with the manufacture of gas and the sending of it out than anything else. At the same time, when their friends Mr. M'Gilchrist and Mr. MacPherson spoke about differential rates, one point which struck him was that they seemed to make out two different classes of consumers altogether—they seemed to imply that those who used gas in cookers and for motive power did not employ it for lighting. He thought that the way in which the subject should be looked at was that those who burnt gas for lighting were increasing their consumption by using it for cooking and motive power; so that they were actually getting a larger quantity of gas consumed through the same meters and mains and services, instead of, as they would seem to submit, obtaining a different class of consumers altogether. There was a point, in this respect, in favour of differential rates for gas. In Glasgow, they had a very heavy day consumption for motive power and for cookers; and they did not require to have a differential rate, because the gas was so cheap that it paid people to use it for heating and motive power, as well as for lighting. But where there was a high price charged for lighting purposes, perhaps a differential rate might lead to a very much larger consumption.

Mr. W. C. Peebles (Edinburgh), who, though not a member of the Association, was granted permission to speak, said he thought it would be a most important matter for gas managers to consider as to giving a little benefit to people who were using very much more gas than ordinary consumers, in the way of charging a differential rate. Such consumers were not only using gas for lighting their premises, but were burning a very large quantity for trade purposes. Where would they get an ordinary consumer whose gas bill came to £1 a week? The man who made great use of gas expected to get more concessions than one using a small quantity. He was sure gas managers would find it to their advantage to have differential rates, and that those who had begun to do so had no reason to regret it. His firm had lately taken up the manufacture of gas-engines. They used a good deal of gas, besides that which was required for testing and the like; and he considered that they should have a differential rate. He was sure that if gas managers would adopt such a plan, even though they should make it experimental, they would find it to their advantage. He should like to point out that Mr. Pooley spoke of nominal horse power. This was a most misleading term; it did not really indicate anything to manufacturers of gas-engines, and it was a term which was becoming obsolete. A man would be putting in an engine without knowing what size he wanted; and he might say: "Nominally, I want 10-horse power." But the engine would really give out not 10 but 20 horse power. This was again misleading, because they had the nominal horse power, the power which the engine actually received from the gas, and they had the indicated horse power, which was the power given out by the engine, or the power which was available for the driving of the machinery. He was sorry that Mr. Pooley had stated that the gas required per nominal horse power was 20·31 cubic feet. He was rather afraid this was a mistake, because it brought the amount down to about 10·31 cubic feet, for the brake horse power was double the indicated horse power. Some makers reckoned the nominal horse power at half the indicated, and some at half the brake horse power. It was quite a confusing term. He said that people should do away with the term "nominal horse power." But Mr. Pooley stated that the nominal horse power would require 20·31 cubic feet of gas. If they spoke of this in terms of the brake horse power, it brought it down to about 10 cubic feet of gas; and it was therefore not correct. No engine ever did such a thing. Then the statement of 13·54 cubic feet per brake horse power he did not think was correct. He was sure this was too little. He would point out that, in connection with a gas-engine, they required a sufficient size of meter, because, if they had a small meter, every time the engine took a supply of gas it emptied the

bellows of the meter, and therefore the diaphragm had to fill up more than its real quantity; and the meter would indicate only 13·54 cubic feet, while it might have been supplying a great deal more gas. In ordinary working, he did not think there was any engine, doing actual work, which would go beyond that. Gas-engines should have a good pressure. It was a mistake to keep down the pressure, because if they found in putting in the engine that the pressure was low, all they had to do was to close up the air-pipe a little, so as to make the engine suck the gas. With good pressure, the engine had a full charge of gas; and a good pressure was about 10-10ths.

The PRESIDENT said they had had a very good conversation upon this subject, which showed how profitable such papers were. As Mr. Stewart said, it was a good example to the young members. It was not necessary to wait till they had something highly technical or original. See how much information they had obtained—see what they had had from Mr. Peebles. The view had never occurred to him as to the sucking in of the diaphragm. He knew quite well that a small meter was very undesirable; but it never struck him in the light that it was against them. As regarded the 13·54 cubic feet, he questioned that himself. He had an 8-horse power engine, which worked very fairly up to its load; and he found that it took about 22 cubic feet per hour, doing full work. This was, he thought, about what an engine would take. He was not very clear himself about the differential rate. It was said that it helped to encourage people in business to employ gas-engines; but, as a rule, gas-engines were only economical in small sizes. Very few people would put in a small steam-engine down to 2-horse power, because it would require a man to attend to it, and therefore a gas-engine would compete very well with it. The differential rate, it was said, would be for gas supplied through the same apparatus. But there must be a separate meter if they were to have a differential rate; so that there would be a good deal of extra expense to begin with. There was another thing. If they were to encourage individuals to use these appliances because they were to be employed for trade purposes, why should they compel the grocer and other tradesmen, who used a large quantity of gas for lighting purposes in their shops, to pay increased rates in order that those who used gas for cooking and motive power might have it for less? It was said that it was intended to try to bring in a set of new customers; but why should they offend the old ones? In his place, he told the people to go elsewhere and get stoves, and he would supply gas for them, as well as for other people, at a reduced rate. But the people said: "No; reduce the price to us, and we will put in stoves." Therefore he did not think a differential rate was a good thing.

Mr. T. WILSON (Coatbridge) contributed a paper on "Prepayment Meters." Unfortunately, he was unable, on account of an attack of rheumatic fever, to be present at the meeting; and the paper was therefore read by his son, Mr. Andrew Wilson, of Perth. It was as follows:—

PREPAYMENT METERS.

I thought it might possibly interest some of the members of the Association were I to give my experience with prepayment meters, and an account of the success which has attended their introduction in Coatbridge. When these meters were first brought out, I was rather sceptical as to the chances of their finding general favour with the consumers, thinking that the trouble entailed by the necessity of having to continuously drop in pence would be a serious objection. I was very much pressed, however, by some of our Scotch meter makers to give them a trial, which I ultimately did, close on three years ago.

My first aim was to secure not only a meter of good quality, but also one having as simple and perfect an automatic arrangement as possible. Having obtained samples from a number of meter makers, and discovered which, in my opinion, were the best and most suitable, I ordered a small number to begin with. These were no sooner in our hands than they were fixed for consumers, with the result that in a very short space of time the demand was so great that we could not get delivery of them from the makers quick enough. Since then, and up till now, the demand has continued. At present there are over 1200 in use, which means, seeing that our total number of consumers is 5368, that we have 22 per cent. of them using prepayment meters. I may also say here that in Coatbridge mostly all the meters in use are tin-cased drys; the automatics are wholly 2-light tin-cased drys. In all cases meters are fixed free, and no meter hire is charged. We have not, as yet, had a single application for any larger sized prepayment meter.

For security, we take from ordinary consumers deposits ranging from 5s., and on all deposits amounting to 10s. or upwards 5 per cent. interest is paid. A large number of householders in our district were unwilling to pay these deposits, and consequently used oil instead of gas. But there being no necessity to insist on deposits in the case of prepayment consumers, we supplied them with meters quite unconditionally; and we have all along found that neither the meter nor the cash has been tampered with in any way.

Most of the houses in Coatbridge are supplied with gas-fittings, so that our district was one well suited for the introduction of the prepayment meter. We had a few meters sent us at the start that did not give us the satisfaction we should have liked; but these were returned to the makers, and we have now little or no trouble with those in use. Our inspectors take the indices and collect the cash quarterly; and they invariably find the amount in the box to correspond with the indices. While on survey, they can overtake as many as from 60 to 80 per day, according to the nature of the district.

The meters were set at first to pass 20 cubic feet per penny; an extra charge of 10d. per 1000 cubic feet being made to cover interest on the larger capital outlay on the meter, as compared with the ordinary ones. The consumption by prepayment consumers has, however, so far exceeded our expectations—ranging, as it did in one year, from 6000 to 12,000 cubic feet—that quite recently my Directors, when reducing the price of gas to ordinary consumers to 2s. 6d. per 1000 cubic feet, thought themselves warranted in only charging 5d. more per 1000 cubic feet to automatic consumers, instead of 10d. as at first. As a consequence, we are now charging only 2s. 11d. per 1000 cubic feet, which we feel assured will yield a very good margin of profit. Taking the case of the smallest automatic consumer, burning only 6000 cubic feet, this extra 5d. will yield 2s. 6d., which is equal to 12½ per cent. on the extra cost of the automatic meter as compared with the ordinary one. In addition to this, there is the profit on the increased sales of gas, which, in our case, is never less than 1s. per 1000 cubic feet.

Instead of incurring the trouble and expense of readjusting the meters when reductions in price are made, we have adopted a system of returning the difference between the price when the meters were first set and the reduced price. This system of refunding has a very agreeable effect on the consumer, who regards the 1s. 3d. per 1000 cubic feet consumed—the amount at present refunded—as a sort of dividend worth looking forward to; and instead of the orthodox grumble as to overcharged bills, we have often expressions of pleasure and satisfaction awarded our inspectors on their welcome visits. We, of course, intimate to these consumers, through the Press and by our inspectors, the amount which will be refunded on any alteration taking place in the price.

From my experience with these meters, I do not hesitate in the slightest in recommending their introduction on an extended scale in any town, as by their means the industrial classes, who have hitherto been more or less partial to oil, are reached; convinced as they are that they are now cheaper with gas. The result is that a considerable increase of revenue is derived by the gas manufacturer, through the wider use of gas as an illuminant, and otherwise, which accrues from this rather novel, though, in my opinion, perfectly practicable method of supplying the same.

At the close of the paper,

Mr. WILSON read a letter which his father had received from Mr. T. Douglas Hall, of Montrose, in which the following passage occurred:—

I am sorry I am not to be at the meeting to back up your notes on "Prepayment Meters"—not that I could have added much, for I have only 46 in use, but those are all new accounts for the year ending May 1. Those 46 meters returned 258,600 cubic feet, yielding £62 2s. 7d., at 4s. 9d. per 1000 cubic feet, or an average of 25s. each, equal to a consumption of 5600 cubic feet each. Our price to ordinary consumers is 4s. 5d. per 1000 cubic feet, so that we get an average of 4d. per 1000 cubic feet for use of meter. Some meters are a penny or two short, some over; but the bulk of them are correct, especially the shilling ones. That is my favourite meter. A large class of consumers prefer them. Out of one shilling meter I took, in one quarter, 96s. Of the 46 prepayment meters, eight are shilling ones, one a 10-light meter, fixed by request in the Salvation Army Barracks.

Discussion.

The PRESIDENT said they had there a very pleasant paper, perhaps, however, with not much matter in it for discussion. In the first place, he must congratulate Mr. Wilson upon his first appearance there. That was his maiden speech among them; and though he was only acting as deputy, they were very glad to see him. They trusted it would not be his last appearance. The subject of the paper was one which was only a matter for experience again. There was nothing controversial in it. Mr. Wilson's was a very unique experience, in the number of meters he had fixed in the short time and in the results he had obtained. He (the President) would like to hear if any other members had done likewise.

Mr. A. YUILL (Alloa) said that some three years ago—just about the same time that Mr. Wilson introduced prepayment meters—they in Alloa also began to do so; and at present he thought they had over 250 fixed. When they started, they had the meters set to give 25 cubic feet for a penny; the price then being 3s. 4d. per 1000 cubic feet. Since then, the charge for gas had been reduced to 2s. 10d. per 1000 cubic feet; but they had not made any alteration in the registration of the meters. The meters continued to pass 25 cubic feet for every penny put in; but when they were on survey, the difference was returned to the consumers. Before they went into the subject, they thought it advisable to make a canvass of the town, to ascertain as far as possible the exact number of houses in which gas was not used; and, being a Corporation, they were in perhaps a better position than a gas company would have been for obtaining the information, because they had access to the valuation roll of the burgh, which gave them the names of the landlords and of all the residents in the town. They took down the names of all over £4 of rental who were not

consumers of gas, and sent an official circular to each. This, he thought, was the means of getting a larger number of consumers through prepayment meters than they would otherwise have secured. They had certainly had no reason to regret what they had done; and, like Mr. Wilson, he would recommend their use.

Mr. J. THOMSON (Inverness) said he also had had a little experience with prepayment meters. He thought he had 70 or 80 of them; but they were not so hard upon their consumers as some appeared to be, because they only charged 5d. extra for them. Since putting them in, they had had an increase of a million cubic feet per annum. He thought they had come to stay.

Mr. D. VASS (Portobello) said he should like to ask if any of the members had trouble with ordinary consumers desiring these meters. He had about fifty meters out; and he was often asked by those who had ordinary meters, if they would be allowed to have prepayment ones. He had made it a rule not to give them, because the old meter, on coming in, was practically left on his hands. He might not, at the time, have a consumer wanting an ordinary meter of that particular size, nor for some time. His experience with prepayment meters was not so good as Mr. Wilson's. Their average consumption in them was only about 3000 or 4000 cubic feet per year; and the meters were much more troublesome than ordinary ones. Often a bad penny was put in; and in cases of houses let for the summer season, the tenants did not attend to the instructions, with the result that trouble was given. He had been sent for twice in one quarter to release a meter. Therefore it was not all gain; and it might be necessary, in some cases, to charge more than 5d. per 1000 cubic feet to cover the extra cost.

The PRESIDENT said they had had an interesting conversation—interesting so far as it showed what had been done in a very few years. Apparently Mr. Wilson had put those forward as new consumers. He did not think he had blocked any of his old consumers out; so that it was really a gathering in, and became a profitable business. He was somewhat of the same mind as Mr. Vass. He was in a non-progressive town. Therefore it was over-metered in the meantime; and if anyone was furnished with a prepayment meter, an ordinary one was displaced, which was not a very profitable way of promoting business. There was one class of consumer, however, in regard to whom these meters were of great service. They all suffered more or less from him. He meant the impecunious individual—the perfectly honest person, who never could save sufficient money to pay for a quarter's gas, and who consequently had to be cut off. Instead of losing a good consumer of this kind, it was more profitable to give him a prepayment meter. This was the sort of consumer he had for them. He obtained some meters in the very early days of them; and they had given him some trouble. He had some which would take any amount of money, but give no gas; and he had others which would pass any quantity of gas without the money being put in. But the meters which he was getting now he had no difficulty with, though sometimes the consumers gave him trouble. The other day he had to go a mile and a half in the rain to see a meter. He found it was all right. The people told him they could get no light from one particular burner; but he found that someone had lighted a candle at that burner, and that a drop of grease had stopped up the orifice. He had all his trouble for that. He proposed a hearty vote of thanks to Mr. Wilson. They were sorry that his father was not there; but they were glad that they had there a very worthy substitute indeed.

Mr. WILSON said he must thank them for the patient hearing they had given him. He was sorry his father was not present, because he would have done the subject much more justice. Fourteen months ago he asked to be allowed to introduce prepayment meters into Perth. He was instructed to get six; and these he put into various quarters of the town. He had applications for others, which were granted; and now they had fully 800 of the meters in Perth. The bulk of them—over 700—were for new consumers. They made a rule, when they started, that no meter was to be taken out to be replaced by a prepayment meter. But they had had to depart from the rule in some cases, especially where the people were bad payers. They had, however, to be careful, because in taking off an ordinary meter and putting on a prepayment one, they might be relieving the consumer of what he owed for gas consumed. Only about six meters had given them trouble; but they were late in starting, and perhaps got the benefit of the experience of other people. They had very little trouble with bent pennies; but this might be owing to the mechanism of the meter. He was very fortunate in Perth being a growing city, because on account of that fact he had always an outlet for any meter which might be taken off. With these 700 new consumers, they had an increase of between 11 and 12 per cent. per annum in the consumption of gas, which was to a great extent due to the prepayment meters. They were now reaching a class of consumers which were never reached before. Though they had broken their rule regarding the taking off of ordinary meters and replacing them by prepayment ones, he thought they had been warranted in doing so. At first, he gave 20 cubic feet for a penny; the price of gas being 3s. 6d. per 1000 cubic feet. Meter-rents were then abolished altogether; and his Committee told him to give the people their full pennyworth of gas. The price of gas had also been reduced to 3s. 2d. per 1000 cubic feet; and he was supplying 25 cubic feet for a penny. This gave them a little interest on the money they had laid out, but not much. When they abolished meter-rents, they said that if they were to give one consumer a benefit, they must do so to all.

Mr. D. M. NELSON (Glasgow) read the concluding paper, the title of which was—

THE BEST AND MOST ECONOMICAL MEANS OF PURIFYING COAL GAS.

The Executive of our Association, in providing a title for the subject-matter of this paper, have suggested a task of a somewhat pretentious nature, and one very difficult, if not impossible, of performance, as he would be a bold man indeed and clever who would arrogate to himself the capacity of being able to propound to a body of directly practical men such as are here assembled, the dogmas of what are the best and the most economical means of accomplishing the purification of coal gas, or indeed of any one thing upon which so many experiences differ, and what are embraced in the huge catalogue of gas manufacturing expedients, especially in relation to the perplexing process of thoroughly removing what are known as the common chemical impurities from coal gas to be employed for illuminating purposes. It goes without saying that it is of the utmost importance that the highest chemical knowledge and most indomitable perseverance should be brought to bear upon this department of the gas industry; for upon the purity and high illuminating power and the moderate cost of coal gas will depend its power to resist the encroachments of its electric competitor—a rival which, thanks to public favour, "wet nursing," and fostering care such as the introduction of gas never enjoyed, is making itself more felt as time goes on. For while there are those who say that gas interests have not suffered by the introduction of the electric light, there are others who know that its safety so far has been owing to the additional uses to which it can be put, such as for cooking, heating, and motive power; also to its higher illuminating efficiency with incandescent systems of lighting. These have done more than anything else to stop the raid upon the gas preserves by the sharp-shooting electric lighters. They have tended to increase the manufacture, and consequently reduce the cost of gas, the low price of which to the ordinary consumer has undoubtedly induced him to substitute large for small burners, and thus to consume more of it; lowering the illuminating power rendering this imperative if a satisfactory light is to be obtained.

If electric lighting has done nothing else, it has been of incalculable value to the gas industry, which for long lay somewhat dormant, in stirring up the latent energy and sharpening the wits of those controlling gas undertakings to scheme ways and means of cheapening and perfecting the production of what is, all things considered, the very best form of artificial lighting. The possibilities of gas production and supply are far-reaching; and it is no rashness to prophesy that ere many years have passed we shall have the gas supply free of charge—an impossibility in the case of electricity, as this costs money to produce, and is devoid of residuals. Coal must be distilled for the sake of its numerous commercially valuable products, a moderate increase upon the selling price of which would, in the case of a city like Glasgow, enable the municipal authority to give gas free, and to feel obliged to the public for consuming it at their burners; this being the very best means of disposing of it, as it could not be safely discharged into the atmosphere. Thus the present enormous expenditure upon meters and the collection of gas-rates, &c., which are mainly what the public pay for under the name of gas supply, would be no longer necessary.

A good many years have elapsed since the speaker last discoursed to the members of this Association on the subject of gas purification by means of oxide of iron. Since then, many materials and methods have been tried with a view to lessen the cost and improve the labour of purification; but perhaps with the exception of lime and oxide of iron, all have been more or less only partially successful. These two materials have, better than any others, maintained, and in some respects improved, their hold upon gas managers, until it might now be said that they are the very best materials that can be employed for the purpose of gas purification, whether used singly or together. The object of this paper is to afford evidence that lime used in conjunction with oxide of iron instead of, as is commonly the case, being employed exclusively, is the "Best and Most Economical Means of Purifying Coal Gas." Neither material is, by itself, a perfect or complete performer of the duty of purification; yet together they contain all the elements requisite, and when united as fellow-workers can be made to perform the service of purifying agents better and more economically than any other substances known at the present day. While complaints may be made in respect of both materials that they are at times of an inferior character, and do not perform the allotted amount of duty expected of them, the faults may not lie in the materials at all; for even the very best material improperly treated will show no greater efficiency than inferior stuff. Much care and skill is therefore required in the choice, preparation, and treatment of the less well-known material bog ore. This is exemplified when it is found that in dividing a cargo of uniform quality over half-a-dozen different works, although in the same district, and using similar mixtures of coal, very different qualities of gas, and different costs per million cubic feet for purification, will be found. Doubtless there are

local causes—such as arrangement, and limited dimensions of apparatus—to largely account for these differences. Still a lengthened study and experience points to the conclusion that individual skill has much to do with the successful issue.

As this subject does not readily lend itself to diagrams or illustrations, this paper will only serve to point out shortly, and in a simple way, the application of lime and oxide of iron, especially the latter, which is not sufficiently well known or so largely employed in Scotland as its merits deserve; preferring to leave an opportunity for inquiry and discussion at the close of the paper, which, after all, is the most direct means of gaining information.

The extreme difficulty gas managers experience in getting rid of their spent lime must be the writer's excuse, to some extent, for bringing the application of oxide prominently before the Association; and were it not that great advances have been made and profit largely reaped by its extended use in recent years, the results of which will be shown presently, it would be injudicious to interfere where lime is an old and all-round useful servant, such as it has proved itself to be in the economy of gas manufacture; and it will be a powerful rival indeed that will displace it in the estimation of gas managers. Yet, from no fault of its own, but because of the increased excellence of condensing, scrubbing, and washing apparatus, lime in a fouled condition does not now possess the value it formerly did. The time was when the crude gases were very imperfectly scrubbed or washed; much of the ammonia finding its way to the lime in the purifiers, and thence with it to the agricultural land, where its enrichment of the soil was a welcome help and means of profit to the farmer, and also a source of revenue to the gas authority—from 5s. to 7s. a load being got for it. But the ample and perfect apparatus now employed cuts off and deprives the lime of such nutritive value; so that it has become really a waste product in the literal sense of the term, as farmers will not take the stuff, even as a gift from such well-appointed gas-works. Indeed, many managers have to load it up for nothing. What with the too abundant supply and consequent low price of sulphate of ammonia (£7 10s.), managers so circumstanced with their spent lime, might consider the feasibility of charging it with ammoniacal properties sufficient to render the stuff a marketable article and remunerative bye-product. Times are changed from those when sulphate sold at £20 per ton. It is, however, no design of this paper to stimulate the use of spent lime, or to fortify or set it up as a rival to spent oxide, for which there is a good demand, and a profitable return to the gas authority, because of its richness in sulphur compounds and cyanides. For while the lime is now being deprived of that which would enhance its value as a fertilizer, oxide of iron is, on the contrary, being charged to its fullest capacity with so-called chemical impurities, the extraction of which by chemical experts in this country, but more largely and to greater profit on the Continent, has raised this product to the position of being an important article of commerce, and of regular marketable value.

From the foregoing, it would appear as if the wrong end of the subject had been given first. But the object has been to at once enlist an interest in the matter, and prepare the hearer for the somewhat dry facts of the results of practical working and the economies and profits arising therefrom which will be stated very briefly.

As regards lime, it would be egotism on the writer's part to occupy the time of the meeting with any description bearing upon the selection, preparation, or treatment of it. Allusion need only be made to it in its relation to, and behaviour with, oxide of iron. One of our Past-Presidents—a gentleman well qualified to pronounce an opinion on this subject, when addressing us some years ago, said: "All things considered, in a matter of purification, advantage must be taken of the better knowledge and greater experience now prevailing to cheapen the process by using large purifiers in order to effect the most efficient combination between the purifying materials and the impurities we wish to remove, by passing the gas *slowly* through." This meant, as a matter of course, that purifiers should be ample in capacity, and have large purifying area, especially surface, for the gas to act upon. Undoubtedly this is now an ascertained fact, and accounts for the recent demand on all hands for larger purifiers; surface area rather than depth being the chief consideration. The difficulty is in knowing when purifiers are deficient, merely sufficient, or ample in capacity. It would be impossible for any writer of a paper to dictate as to this. Each district has its own special difficulties to be considered and local circumstances to contend with, such as in the matters of quality of coal, its distillation into gas, and the kind and quantity of purifying materials employed; also, as already suggested, the nature and efficiency of the other condensing and scrubbing plant upon the works.

But for the purposes of illustration we may select any gas-works in Scotland producing up to 50 or 60 million cubic feet of gas per annum. The proportion of lime and oxide required, will vary according as the impurities in the coal predominate—a large proportion of first-class lime being required where carbonic acid is found largely in excess, and a due proportion of oxide where sulphur compounds are too abundant, which when permitted to escape in the form of sulphuretted hydrogen contaminate the atmosphere and injure the valuables of our dwellings. Carbonic acid gas, being less perceptible by the sense of smell, is none the less objectionable because of its poisonous nature, and the deleterious part it plays with the illuminating power of the gas. Our present purpose will be served by dealing with these two broadly-defined impurities, rather than by going into the other and more complex *minutiæ*.

Assuming that four purifiers are in use, although oxide can be, and is profitably employed in small works where only two purifiers are in operation, it is a distinct advantage to have, in addition to these four, an initial (or catch) purifier, the object of which is to receive the crude gas passing from the washer (or the scrubber if there is no washer). This gas, in passing through the oxide in this purifier, is, by a kind of filtering through the soft fibry porous oxide, relieved of whatever tarry particles it may carry by escape through the washing process, and this prevents such particles from reaching the lime, where they would, from their glutinous nature, form an impenetrable skin or crust on the surface of the material; thereby preventing the gas finding or forcing its way through the mass, but rather causing it, because of this obstacle, to uselessly spread itself, and pass up or down, as the travel might be, the side and end spaces of the purifier boxes, without going as noted through the mass of purifying material. As will at once suggest itself, the gas at this stage and in this crude condition is largely charged with sulphur compounds, for which oxide of iron has a great affinity—indeed, a much greater affinity than has lime. Being relieved of the tarry particles and sulphur compounds, the gas will thus pass on to the lime in a semi-clean condition; giving the moist lime only the work of absorbing the carbonic acid for which it is specially useful.

It will thus be seen that the two materials acting in succession more fully discharge the duty of complete purification than either could accomplish it separately. Three purifiers (one oxide and two lime) may be worked to great advantage where four purifiers are not available; but as already indicated, the service of a catch purifier and four purifiers, would be more thorough, and of greatly increased efficiency. They could be worked in the following rotation: The gas will first pass through the catch purifier (No. 1), and then enter No. 2, which by preference should also contain oxide, so as to exchange with No. 1 in the renewal. Nos. 3 and 4 lime, also No. 5 lime. If the arrangement of valves admit of all three being in use at one time when necessary, so much the better; the writer's desire being to avoid the change of lime as long as possible. The oxide requires fewer changes than lime; indeed, where lime needs renewal once in every eight or ten days, oxide may remain undisturbed for as many weeks. It will be seen that the action of the oxide upon the crude or dirty gas is a distinct gain, and has the effect of prolonging the purity and life of the lime, and therefore its active usefulness, to a very great extent—indeed, to an extent quite unknown prior to the introduction of oxide—and goes far to reduce the quantity of lime used in the course of the year. It may be remarked, in passing, that while lime is exhausted and removed as foul and useless after an interval of eight or ten days, oxide only requires to be removed after lengthened periods of work; and by exposure to the atmosphere, by being spread out for the elimination of the free sulphur, it is revivified, and returned to the purifiers to do further duty. This goes on for a period of several years, until the oxide is fully charged with sulphur and other chemical compounds, which render it an article of considerable value to the chemical manufacturer, and of profit to the seller. Even a casual observer will at once see the enormous saving in labour effected when oxide and lime are used in conjunction, as compared with the use of lime alone, not to speak of the substantial gain in comfort and convenience through the less frequent discharge of noxious pungent vapours into the atmosphere, to the annoyance of the surrounding amenities, when the purifiers are being changed.

It would detain this meeting too long to follow the complete process of purification from the start to the finish, and to enlarge upon the benefits and economy derived from the use of lime and oxide in combination; and as an ounce of practical result is worth any quantity of specious averment, the following abstract statement will doubtless be of interest to managers who have not succeeded so well, and act as a stimulus to others who have not yet fairly or fully considered the subject, but have rather viewed the oxide of iron process of purification through the arguments of a prejudiced medium. The instance about to be quoted is a hard substantial fact, away from the domain of romance. It relates to an ancient town where more than ordinary difficulties have been experienced in the manufacture of gas; and doubtless to these very difficulties may be attributed the zeal and skill displayed in surmounting them. At any rate, the writer's knowledge of this town's gas-works goes back much farther than 1875, prior to which year lime alone was used. The cost, *exclusive* of labour, was 2d. per 1000 cubic feet of gas made. During the intervening period—1875 to 1890—many experiments and methods were tried, with somewhat encouraging results, all tending to improve and lower the cost of purification, until something like ½d. was the cost per 1000 cubic feet *inclusive* of the cost of labour. In 1890 a definite course of using oxide with lime was established (it had been going on only intermittently before); employing about equal proportions. The effect was to reduce the expense of purification in that year to 0·4d. per 1000 cubic feet, including the cost of

labour, or a saving of 1·6d. per 1000 cubic feet against the earlier use of lime alone. In 1896, using lime and oxide as before, but revivifying the oxide *in situ* instead of taking it out, through the introduction of about 1 per cent. of atmospheric air at the inlet of the purifiers, reduced the cost of purification, including all labour, deterioration of the oxide, which then contained 59 per cent. of fixed sulphur, and the upkeep of the air apparatus to 0·173d., or less than three-fourths of a farthing per 1000 cubic feet. A new set of larger purifiers, and a fresh supply of the natural oxide of iron have recently been put in operation, and with these the Manager intends working during the ensuing winter; and he feels no hesitation in saying that they will beat their last year's low record in purifying say 40 million cubic feet, for something under £19, or one-half of a farthing per 1000 cubic feet.

Of the many experiences—more or less good—the foregoing is certainly an "eye-opener;" and the fact that gas is of greater purity, and frequently of higher illuminating power, from works where oxide is used in conjunction with lime, may be assigned as a good reason why oxide should be more generally adopted. Although the increase, in the writer's experience, has been very encouraging, still, it may frankly be stated that, from causes which might be easily surmounted, oxide has not had so much attention given to it, or the trouble taken with its use, as it deserves; and the fact that, in a works whose operations have been beset with many drawbacks, the cost of purification should be brought down, by patient and persevering skill, from 2d. to less than three-fourths of a farthing is indeed phenomenal, and, considering that the illuminating quality of the gas is fully maintained, is highly creditable to the management.

Discussion.

The PRESIDENT said they had had a very interesting paper from Mr. Nelson. He could not say of it, as of the others, that there was little controversial matter in it, for there was a good deal. The facts Mr. Nelson gave them were very wonderful indeed. The purification must be very efficient to bring it down as far as stated. The man was to be congratulated, whoever he was, who could get the cost down so far as was shown. Mr. Nelson said they ought to leave the ammonia in the lime. This might be a difficult thing to do; but still some might be able to do it; and they would be glad to have their experiences.

Mr. A. MACPHERSON (Kirkcaldy) said Mr. Nelson spoke of the oxide revivifying *in situ*. How was it done? Was it a tray of oxide and a tray of lime turn about?

Mr. NELSON remarked that it was not so. He started the oxide before the lime. Some held the opinion that the lime should come first; but he thought it best for the oxide to come first, for the reason he had stated in the paper.

Mr. MACPHERSON said the figures given by Mr. Nelson were certainly most extraordinary. In the first place, he did not think it should ever have cost 2d. per 1000 cubic feet for purifying; so that the reduction was not so phenomenal as might appear at first sight. Then the introduction of 1 per cent. of atmospheric air, to enable the cost to be reduced to something like 0·173d., he was greatly afraid, would make the consumer pay for the purification, because they all knew that 1 per cent. of atmospheric air would lower the illuminating power 5 or 6 per cent. So that, while it might have the effect of reducing the apparent cost of purification, it was simply taking it out of the consumer in the lowering of the illuminating power; and he thought that if they took the 6 per cent. which would come off the illuminating power, and add it to Mr. Nelson's cost of purification, they would find that something very considerable would have to be debited to purification still. In regard to the other matter mentioned—leaving some ammonia in the gas, and passing it on to the lime—the suggestion was a very good one if it could be carried out. But he thought that, even at the low prices at which sulphate was selling, they would do better to extract it by washing it out. Then they would find very great difficulty in changing their purifiers. They all knew that, if they put a scrubber off for a day or two, the men could scarcely stand to take the lime out of the purifiers. They certainly would not get men to work for ordinary wages at emptying purifiers of lime charged with ammonia. He did not think that a little ammonia in the lime would increase the value to the farmer, because they all knew that, as it was, it was a most valuable agricultural agent, if the farmers would take it. They were all aware that for the reclamation of bog land nothing was better than an application of purifier lime; and for a number of other things—the killing of the grub, for one—they knew very well that it was very beneficial to farmers. But they could not, he was sorry to say, convince farmers of the fact. He had sometimes considerable difficulty in dealing with his waste lime. While oxide of iron was no doubt a very good purifying agent, he must say that he was going to stick to lime; and he thought no one would ever regret doing so. If they could get a good Scotch lime, they would not find a better purifying agent.

Mr. NELSON said he was not very good at retaining figures and remarks; and he asked to be allowed to reply at once. Mr. MacPherson was quite right from his point of view; but in talking of the 1 per cent. of atmospheric air reducing the illuminating power 6 per cent., he overlooked the fact—and it was one of his calculations—that 1 per cent. of atmospheric air introduced into an oxide purifier would not amount, in the course of a year, to the enormous quantity of air that was introduced into a lime purifier in the frequent changing.

Mr. MACPHERSON: If you were a gas manager, you would know that the first thing we do to turn on a lime purifier is to expel the air. We blow it off.

Mr. NELSON: But you have the influence of the air. I am of opinion that you cannot expel the air, after having absorbed it in the lime. It must pass on with the gas. You talk of its being blown off; but we know that cannot be done.

Mr. A. WILSON (Dawsholm) said that, having been accustomed to the use of both oxide and lime and lime alone, he should like to make a few remarks. They were very much obliged to Mr. Nelson for his paper. He made some observations as to the use of oxide in taking up the tarry matter from the gas before it went to the lime. He would say there was something wrong with the construction of the works if the tar were not extracted before the gas got to the purifiers. With reference to the use of oxide before the lime, he was afraid the lime would never get into a proper condition for the taking up of the sulphur compounds—bisulphide of carbon and the like. The use of lime alone in Scotland certainly seemed, so far as he had found, to be the preferable method of working. They had tried both lime alone and lime and oxide. But the position of the Scotch gas was different from that in the South in this respect—the use of lime alone seemed to supply all the necessary conditions for purification. He thought they could work as efficiently with the lime alone as with lime and oxide. They certainly could not do so in the South, where they had to make use of oxide to take out the sulphuretted hydrogen.

Mr. NELSON said he had mentioned in his paper that his remarks had special reference to works which were not of the most perfect and accurately constructed character. He spoke of works producing up to about 50 millions. He was not dealing with places like Glasgow, where the works were perfect in the matter of purification and scrubbing.

Mr. WILSON, referring to the getting rid of waste lime, said they had fitted up appliances for breaking the lime, so that the farmers could apply it by sowing it, instead of sending it out in lumps; and they found that the farmers were now taking it up better than formerly.

Mr. NELSON said he was very glad to hear this, because he remembered at Dawsholm they could not get rid of the lime.

Mr. MACPHERSON: You speak of a catch purifier. Would not one filled with ashes do just as well?

Mr. NELSON: I have the original data here, from the friend who supplied me with the figures on the subject. There is a reference to ashes; but there is such a variety of ashes that I do not know that they could be employed for scrubbing gas which had passed the scrubber and washer. We know, as a matter of fact, that there is a wonderful difference between the production of 14 or 16 candle gas and the higher quality in Scotland; and in some places they use only oxide, which would not do in Scotland.

The PRESIDENT said they were highly indebted to Mr. Nelson for bringing forward his paper. Mr. Nelson laboured under a great disadvantage in not being a gas manager. He spoke of the tar going forward; but that should not be. He gave as the reason why farmers did not now purchase lime as they formerly did, that the better methods of working they had now took out all the ammonia. But it was a well-known fact that the farmers never did get ammonia in the lime. Lime was simply an alkali. It would not be 24 hours out of the purifiers before all the ammonia would be gone. This was not what had stopped the sale of lime. Mr. Nelson's paper was beautifully got up. It was a perfect treatise; but it was perhaps rather behind the day. Oxide of iron was undoubtedly of great advantage to those in charge of huge works. He was sorry to say that, with the exception of Mr. Wilson, of Dawsholm, and two or three others, all who were there were in charge of works which were too small to make it advisable for them to go in for oxide purification, so long as they had such an abundant supply of strong alkaline lime, by which the carbonic acid and the sulphuretted hydrogen could be taken out. In London, it would be an awful business if they had waste lime to dispose of for all the gas they made. But in Scotland he did not think purification would be so profitable, or so easily wrought, with oxide as with lime. He would ask the members to pass a hearty vote of thanks to Mr. Nelson for his paper.

This having been done,

Mr. NELSON said he was very much obliged to them for their vote of thanks. Though they had differed, this was what they were there for. He had given them facts; and facts were "chiels that winna ding."

Institution of Mechanical Engineers.—This Institution celebrated its jubilee in Birmingham recently, when about 300 members assembled under the presidency of Mr. E. Windsor Richards. In the course of the proceedings, Mr. Henry Davis contributed a paper on the Birmingham Water-Works. Mr. A. Bache, who has been Secretary of the Institution for 43 years, has retired, on account of impaired health, and was presented with a sum of £3000. On the same occasion, Mr. J. Forrest, formerly Secretary of the Institution of Civil Engineers, was presented with 50 guineas, in recognition of his courtesy to the members.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

Proceeding with our notice of the papers read at the recent meeting of the above Association, we this week give an epitome of the two dealing with "The Torquay Water-Works" and "Pumping Machinery."

Mr. W. INGHAM (Torquay) contributed the paper on

THE TORQUAY WATER-WORKS.

Passing over the first section of the paper, which contained a number of historical facts relating to the works, we come to the portion dealing with the watersheds, of which there are two, adjacent to one another, and known as the Kennick and the Trenchford Valleys. There are two storage reservoirs in the Kennick Valley; the Trenchford Brook being used only as a supplementary supply. The area of the Kennick watershed is 1280 acres; and of the Trenchford, 961 acres—making a total of 2241 acres. Of this the Corporation own 122 acres; but it is their intention to purchase at an early date about 2300 acres, at an estimated cost of £40,000. The storage reservoirs are situated on the eastern slope of Dartmoor, on the stream known as the Kennick Brook, which is a tributary of the River Teign. The capacity of the Kennick reservoir is 200 million gallons; of the Tottiford, 100 million gallons; and of the Intake, 300,000 gallons. During the construction of the Kennick dam, it was found that the concrete in the lower part of the trench had not set properly, owing to decomposed granite having been used. The concrete allowed water to pass freely through it; and to remedy this, a trench was cut in the concrete, and a wrought-iron plate inserted for a length of 420 feet, and an average depth of 24 feet. This proved successful; and the reservoir is now water-tight.

There are two mains from the storage reservoirs to Torquay. The old main (laid in 1858) is 10 inches in diameter as far as Newton Abbot, and 9 inches forward to the Chapel Hill reservoir at Torquay, and is 14 miles in length. The new main is 10 inches in diameter from Tottiford intake to the Warberry reservoir, Torquay, and is connected with the Kennick reservoir by 1560 yards of 18-inch main, and 840 yards of 10-inch—the total length being 17 miles. The thickness varies from 0·45 inch to 1·25 inches; and the greatest pressure is 300 lbs. per square inch when working from the intake, and 342 lbs. when working from the Kennick reservoir. Sluice and wash-out valves were placed where required; and hatch-boxes are also fixed on the mains for taking out the pipe-scrapers. Owing to the large number of blown joints and burst pipes, the author recently recommended the fixing of 28 automatic double air-valves on the mains. The cost of fixing a 3-inch air-valve, including a 3-inch off 10-inch branch, cover, and manhole, is £10 10s.; while the 1-inch valves cost £2 10s., including fixing. The advantages of this class of valve are that only a small manhole is required; they can be fixed where the mains are laid shallow; and the sluice-valve is vertical, and can be packed under pressure.

The old main requires scraping annually, and costs £10 each time it is scraped, or about $\frac{1}{10}$d. per lineal yard. Before scraping, the delivery of the main into the Chapel Hill reservoir is 550 gallons per minute, and after 708 gallons; or, speaking roughly, a coating ¼ inch thick forms on the inner surface of the main—making virtually a pipe of 9 inches diameter by the end of twelve months. The increase in delivery is 28·7 per cent. During the summer of last year, it was found necessary to scrape the new main for the first time; and the deliveries into the Warberry reservoir before and after scraping were 516 and 663 gallons per minute respectively, or a gain of 28·5 per cent. It may be noted that the old main was uncoated, and the new main coated with Dr. Angus Smith's composition. The author has observed that corrosion takes place quicker where the velocity of water is greatest. The quantity delivered into Torquay when both mains are unscraped is 1,535,000 gallons per day; and, after being scraped, 1,974,000 gallons per day. If the Kennick reservoir head (105 feet more) was put on the new main, and the Tottiford reservoir head (68 feet more) on the old main, an increased delivery could be obtained of 93 and 49 gallons per minute respectively. Owing to the soft nature of the Torquay water, rusting takes place very quickly; and the reduction in area of some pipes recently taken up amounted to 34·5 per cent. for the 8-inch, and 39 per cent. for the 12-inch. These pipes have been down about 40 years. The scrapers in use are the joint invention of Messrs. Box and Froude; and they do their work exceedingly well. The chemical composition of the rust is protoxide and peroxide of iron, and is readily attracted by the magnet. The amount of iron in the rust amounts to as much as 66·1 per cent.; the remainder being solid matter carried by the water and deposited.

All new mains are laid at a depth of 2 ft. 3 in. under the surface of the ground, although the services are only 1 ft. 6 in. deep at present. The latter depth is too shallow, as hard frosts penetrate the ground over 2 feet in this district. It must not be overlooked also that heat penetrates to even greater depths; and the mains ought to be placed at such a depth to keep the water flowing through them as cool as possible in summer. The author is of opinion that water-mains (like sewers) should be laid with proper gradients; and if this was general, there would not be half the trouble with the accumulations of air, and less would be heard of burst mains through ram-action.

The author here gave a specification for water-pipes, which included the following points: All pipes to be cast vertically with sockets downwards; the bore and thickness to be uniform, and the inside of the pipe smooth. Each pipe to be submitted to inspection, and tested to oil pressure before dipping in the composition. If the pipe is proved sound, it is to be reheated to 600° Fahr., and then dipped into a solution of pitch, resin, asphalte, and linseed oil at a temperature of 300° Fahr. Each pipe to be subject to a test pressure equal to at least double the working pressure. It has to be kept on for three minutes, and struck with a hammer while the pressure is on. An inspector is always present during the casting of the pipes; and, in some cases, no less than 60 per cent. of the pipes have been rejected. The cost of inspection varies according to the size of the pipes, and ranges from 1s. to 3s. per ton. The author prefers to pay his inspector a weekly wage rather than at per ton.

The present population of the Torquay water district is about 49,000, and is increasing at the rate of 1 per cent. per annum. Torquay, Newton Abbot, St. Mary Church, and Cockington are included within the limits of supply. The number of houses supplied is 8787, which gives 5·6 inhabitants per house. The number of meters in use for trade purposes is 118. The average quantity of water consumed per head per day throughout the year may be taken at 28·5 gallons; the average for winter being 22 gallons, and summer 36. This means an average daily consumption of 1,396,000 gallons, or 510 millions per annum. The large difference between the winter and summer average is due in great measure to water consumed for garden purposes and baths. The number of baths in use is 978. The garden supplies number 1015—546 using, and 469 not using hose. The gardens with hose pay on the average £1 17s. per annum; and those without hose 17s., or an average per garden of £1 8s.—the total amount received per annum for gardens being £1418. A fair estimate of the quantity of water used for gardens may be taken at 500,000 gallons per day during the summer period of 170 days, or about 85,000 gallons per garden. This quantity at 1s. 4d. per 1000 gallons would cost £5 13s. 4d. per garden, without taking into consideration the extra 4d. per 1000 gallons charged on gardens outside the borough. These figures, the author remarked, are very suggestive, and make engineers think seriously about supplying water by meter. The charges for meter-rents are rather high, and are receiving the attention of the Water Committee. At present they are as follows: ⅜, ½, and ¾ inch meters, 13s. per annum; 1-inch, 14s.; and 2 and 3 inch, 30s. A charge of 16 per cent. on the original cost of the meter is quite sufficient to pay for redemption, interest, and maintenance, if the meter is well selected. The charges for connecting the services to the mains are: ½-inch, £1; ¾-inch, £1 5s.; and 1-inch, £1 10s., with an increase of 25 per cent. outside Torquay.

Storage cisterns for drinking purposes are in general use, and are considered large enough if they hold sufficient water to give a full day's supply. This class of cistern, with loose cover, is perhaps not the best, for people will not look after them properly; but the closed cisterns placed direct on the service-pipe are a considerable improvement.

The author next gave some particulars as to the charges for water-rental; and he then mentioned that the total cost of the water-works has been about £160,000. A description of the method he employs for detecting waste concluded the paper. Three meters are in use for this purpose; and each one controls about 50 districts—each district being metered four times a year. The inspection is carried out as follows: The district is isolated, and put under meter; and the inspector enters the time of shutting the stop-cock in a book giving the list of houses in that district. When the inspection of the houses is finished, the sluice-valve is closed at the junction of the main to test whether or not the main is leaking. The diagram and inspector's book are compared on the morning after the test has been made; and a list of leaks is made out and given to the inspector. He then investigates the nature of the leak, and reports back, when a notice is served upon the occupiers of the house to remedy the defect within three days; and, if not attended to, the water is shut off until the alteration is made. The working expenses are only small, and amount on the average to £147 per annum.

In the course of the discussion,

Mr. W. G. PEIRCE (Richmond) said the charge for water for gardens was a very "touchy" question in the suburbs of London; and it was a disputed point whether a charge could be made for such supplies. The gardens being rated with the houses, the occupiers considered they had already paid for the water used for gardening purposes. The Town Clerk of Richmond had found that water was supplied for gardens by agreement in certain places; and, in consequence, notices and a scale of charges had been sent to occupiers of gardens of an area of above 200 square feet. Supposing, however, an occupier of a garden of (say) 500 square feet did not choose to sign the agreement, he simply declared he had no use for Corporation water, and only used waste or any water that was available. It was a serious matter for the Corporation, because they had to purchase a large quantity of water.

Mr. T. KENNEDY (Kilmarnock), referring to the point in the

specification for pipes as to dipping them, said his experience was that, if they heated the casting and dipped it into the hot solution, a coating of asphalte was formed on the outside, which rendered it impervious to the thinner liquid going into it. The modern practice was to put the pipes in, and let them heat up to the temperature of the solution. Then the solution was thin; and it adhered much more firmly.

Mr. D. M. F. GASKIN (Nottingham) did not agree with the author as to the water-pipes being laid at one gradient the same as sewers—for one reason because it would lead to enormous expense. Then, as to the use of automatic air-valves, his experience was that they admitted as much air into the mains as they let out. He found the ordinary hydrant quite sufficient for letting the air out when charging a main. Regarding the use of water for gardening purposes, he had tried to ascertain the difference between the quantities consumed in times of drought and extreme frost; and he found that in residential towns, with gardens, the water used in summer was something like 8 gallons per head per day beyond the average. Unscrupulous people who wasted water in their gardens should certainly be charged by meter. As to the use of bent ferrules for services, he preferred tapping the main under pressure, as this method had three distinct advantages: It did not cause waste of water; the main was not injured; and there was a minimum of inconvenience to the consumers on the line of pipe.

Mr. W. MATTHEWS (Southampton), alluding to the use of air-valves, said he had lost faith in them, and now employed a little snifting valve—perhaps a $\frac{1}{4}$ or $\frac{3}{8}$ inch—leaving it always just on the drip; so that if there was any air in the main, it could pass away. There need be no fear of any entering. He noticed that some of the mains at Torquay required scraping annually, which seemed to bear out the prediction made some years ago that, if scraping was once commenced, it would have to be continued. The mains in question had not been provided with the means of discharging air in the past; and, by getting rid of the air, he thought the author would not have so much corrosion in the future. He did not agree with him that corrosion was greatest where the velocity of the water was greatest; his experience being that the reverse was the case. A depth of 18 inches for service-pipes was too shallow; and he (Mr. Matthews) now put them 3 feet down. As to mains being laid at a uniform gradient, not only would extra expense be entailed, but depth would have to be sacrificed in some cases, and great trouble would also arise in having to search for mains 7 or 8 feet deep. As to garden supplies, he thought that, unless Torquay was differently situated to other places, half a million gallons of water per day for 170 days of the year, was an exceedingly big estimate. At Southampton, the mean consumption did not vary 10 per cent. between the highest and the lowest. He expressed a preference for stopcock ferrules; and as to storage cisterns, he could not see why they need be continued if the supply was constant.

Mr. C. H. PRIESTLEY (Cardiff), speaking of the use of water for gardening purposes, thought they ought not to impose any restrictions in regard to the beautifying of their towns. At Cardiff 10s. a season was charged only where a hose was employed, whether the garden was large or small; but, in his opinion, in the case of large gardens, a meter should be used. Main pipes should not be laid at a less depth than 3 feet; and service-pipes, 2 ft. 6 in. During the frost two years ago, they had pipes frozen at Cardiff at 26 inches deep. He did not think storage cisterns were necessary where the supply was constant; but, in his case, the regulations provided that, where a cistern was used, a tap should also be fixed on the rising-main.

Mr. C. E. JONES (Leyton), alluding to his experience in the Midlands, stated that, during the severe frost of two or three years since, he found, in the most elevated place in his district, that the distribution-pipes were fractured at a depth of 3 ft. 6 in. Where the constant supply system was in operation, storage cisterns were not required; and where they were employed, they should certainly be covered. As to the use of self-acting valves, if leading mains were under constant pressure, very little air would accumulate in them; but if there was an intermittent service of water, such valves were of considerable advantage. They were liable to pulsation, especially on pumping-mains, in which case it was best to use some other form of valve. As to the supply of water for gardening purposes, his practice had been that where land was used solely as a garden, and was rated with the house, no charge should be made for the water; but if the tenant sold the produce, the water was then used for a trade purpose, and was fairly chargeable. He believed the time would come when the term "domestic purposes" would include everything, and that free water would be supplied in this country; the cost, for all purposes other than trade, being cast on the rates.

Mr. PRICE said at Worcester they allowed the first $\frac{1}{4}$ acre of garden free; but for every additional $\frac{1}{4}$ acre, a charge of 4s. was made. Their water-rates were very low. Sixpence per 1000 gallons was charged for trade purposes; and sixpence in the pound on the rateable value. As to storage cisterns, they ought not to be used where they could be done without. At Worcester, they had certain outlying districts where they had a difficulty in supplying the upper rooms of a few of the houses in the daytime; and in those cases, cisterns were useful, as the pressure was sufficient at night to fill them. They had a reservoir at a good height; but he did not care to enlarge the mains for a few isolated houses.

Mr. C. SAINTY (Windsor) remarked that in his district they allowed water free for gardens not exceeding 100 square yards; but above that a charge was made by meter or agreement.

Mr. J. F. WICKS (High Wycombe) thought the cost put down by the author for inspection was rather insignificant for such a large town as Torquay.

Mr. T. N. RITSON (Kendal) observed that the mains at Torquay were laid at a depth of 2 ft. 3 in.; and he thought there must have been a great destruction of pipes at such a shallow depth during the frost of 1894-5. He (Mr. Ritson) had been drawing up some new regulations; and the Local Government Board had compelled the insertion of a provision that service-pipes should not be at a less depth than 3 feet below the surface; so that 3 ft. 6in. would have to be the depth of the mains in future.

The PRESIDENT (Mr. H. Ashton Hill) said he was inclined to say the Local Government Board had done wrong in compelling Mr. Ritson to put his service-pipes 3 feet down. Perhaps the Board overlooked the fact that the mains would have to be laid 6 inches lower, which would make them a foot deeper than was absolutely necessary. It was a mistake to legislate in a panic. He considered 2 ft. 6 in. to the top of the body of the pipe was adequate for all purposes. As to the charge for gardens, his practice had been to charge either by the area or by meter; but he preferred the former. Regarding storage cisterns, it had been suggested in a letter in the "JOURNAL OF GAS LIGHTING" that the Association should deal with that question; and it might form a subject for debate on a future occasion.

Mr. INGHAM, in reply, said some of the members did not seem satisfied with the statement that 500,000 gallons of water were used per day for garden purposes; but it was nevertheless a fact. When he mentioned that the difference between two days' supply had been no less than 400,000 gallons owing chiefly to the second day being hotter, he thought it would be agreed that a great portion of that was being used for watering gardens. He did not know of another town in the country that had the same garden area as Torquay. From inquiries he had made, the great frost of 1894-5 did not affect the pipes to any great degree. On the average, he did not think the small mains were more than 1 foot to 1 ft. 9 in. in depth to their tops. As to scraping the mains, he found by far the greater number of blown joints and burst pipes occurred after the operation, and that was partly why air-valves had been placed on the mains. With regard to the velocity of the water having an appreciable effect on the corrosion, it was quite correct in regard to the Torquay mains. He did not advocate storage cisterns; but there was a general idea that they would be useful if by chance the ordinary supply was cut off. He still held it was the right thing to lay mains at a proper gradient. In towns they found great difficulty with sewers and gas-mains; and perhaps there the old method of laying up hill and down dale would be best. But, where possible, the mains ought to be laid at an even gradient.

A vote of thanks was passed to Mr. Ingham for his paper.

Mr. ALFRED TOWLER (Leeds) contributed the fourth paper, which dealt with a new installation of

PUMPING MACHINERY.

The plant described has replaced an old Cornish engine at the Everton pumping-station of the Liverpool Corporation. Water flows from Lake Vyrnwy and the Rivington reservoir into a covered-in reservoir adjoining the engine-house, and is pumped from thence into an overhead tank, to supply the highest part of the city. As the water consumption varies considerably, the Engineer (Mr. J. Parry) decided that the new plant should be able to raise any quantity from 600 to 5000 gallons per minute a mean vertical height of 102·39 feet, including friction. Tenders were accordingly invited; and the order was placed with Messrs. Hathorn, Davey, and Co., of Leeds, who guaranteed a duty of 120 millions per 112 lbs. of Welsh coal at the maximum and mean speeds, and 80 millions at the minimum speed. The design of the engine embodies some special features, which are regarded as essential to the attainment of exceptionally high duty. These consist of a complete system of jacketing cylinders, covers, and receivers; of draining them; catching and re-evaporating the moisture; clothing and encasing radiating surfaces; small clearance spaces and clearance surfaces; and at the same time large steam passages and valves, quick in action, and independent in adjustment, so as to effect a minimum loss of steam pressure, and a maximum amount of work from a given volume pressure of steam.

It is well known, says the author, that a great deal of energy escapes into the condenser and chimney, and is lost; so that, if by any means some of this heat could be trapped, a saving in fuel would be effected. In order to reduce the heat losses, the exhaust steam is led through a heater on its way to the condenser, containing a copper coil, in order to heat the feed water before it enters the economizer. Thus sweating, with its deteriorating effect on the economizer-pipes (which always takes place when economizers are fed with cold water), is prevented, and at the same time the feed temperature is increased considerably. The waste gases from the boiler to the chimney are used to increase the temperature of the feed water; so that it enters the boiler at a high temperature, considerably above the boiling-point, at atmospheric pressure.

The pumps, being of the three-throw type, give a fairly uniform flow; and, although they are single-acting, they are so balanced that the work done on each side of the piston is practically the same. The engine is of the vertical triple-expansion three-crank type; the cylinders being placed on the floor-line, the crank-shaft above, and the pumps below. The cylinder base and crank-shaft is supported on girders built into the engine-house walls; and the whole are strutted together with steel pillars. The cylinders are 15 inches, 23 inches, and 38 inches in diameter, by 3-feet stroke. They are all steam-jacketed; while the intermediate and low-pressure ones each have an additional or outer jacket, together forming the intermediate pressure receiver. The high-pressure receiver is a separate casting, and is also steam-jacketed. It is fitted with an internal circulating-pipe and a copper reheating-coil; so that any moisture which the steam may contain will have an opportunity of being re-evaporated and superheated on its way to the next cylinder. In order to reduce clearance spaces, the valves, which are of the Corliss type, are placed in the cylinder covers. The bottom covers are steam-jacketed, so as to re-evaporate any water which has gravitated to the lower part, and have branches, which are connected together and to the receiver. The top covers communicate with the lower ones by passages cut in the cylinder cases.

The valve gear is both simple and effective, and contains 20 per cent. fewer joints than any other gear of equal range of adjustment that the author is acquainted with. Each cylinder is provided with an index marked in decimals, showing the point of cut-off; and the governor may be connected to, and control the steam-valves of, all the cylinders, or those of the high-pressure cylinder only. The exhaust-valves are worked by cams—one cam to each pair of valves. By this means they are opened and closed rapidly. Each valve is furnished with a simple index, showing the lap, lead, width of port, port opening, compression, and release in each respective case, which, the author remarks, is a great convenience in valve setting and adjustment, as anyone can see at a glance the actual working conditions without removing anything.

The governor is of the ordinary centre-weight type, driven from a pulley on the crank-shaft by two belts; but, in order to get the necessary range of speed, variable friction gear is inserted. All the steam glands are fitted with metallic packing, having drain-pipes leading into the hot-well. The high temperature of modern practice will, in the author's opinion, make metallic packing universal. The crank-shaft is of the web type, and is exceedingly strong, as it is carried by two bearings only. The fly-wheels are two in number, and are keyed upon each end of the shaft, and each end is fitted with a crank-pin.

The pumps are three in number, of the vertical single-acting type. The rams are 22 inches in diameter by 3 feet stroke, and are cottered upon the piston tail rods of each cylinder. The rams are so loaded that the dead-weight is equal to half the water pressure on the end of each ram. The pump glands are outside packed, and are water-sealed. The clack-boxes are fitted with multiple disc-valves of hard red fibre, working upon removable brass grids and spindles and phosphor-bronze involute spiral springs, loaded to ¼ lb. per square inch to accelerate their action. The water-ways through the pumps are so large, and the lifts of the valves so small, that it was expected the amount of slip would not, in all probability, exceed 1 per cent.

The pump suction-pipe is provided with a vacuum vessel, and is connected to an existing tank inside the engine-house, which in turn is connected by pipes to the covered reservoir. The delivery-pipe is provided with an air-vessel, fitted with an air-charging apparatus, and is connected to the stand-pipe leading to the overhead tank. The surface condenser is placed in the pump-room; the circulating water being taken from the delivery side of the pumps.

The air-pump is of single-acting vertical type, 10 inches in diameter, by 3-feet stroke, worked off a cross-head fixed upon the low-pressure ram. The boiler-feed pump is 1½ inches in diameter by 3-feet stroke. It is also of the vertical single-acting type, and is worked from the same cross-head on the other side of the ram. The heater consists of a copper coil, placed in the exhaust-pipe between the low-pressure cylinder and the condenser. All the jackets, except that for the low-pressure cylinder body, are furnished with steam at boiler pressure. The latter is supplied with steam through a reducing-valve at 50 lbs. pressure. The economizer is of Green's make, having 48 tubes, the scrapers of which are worked by the main engine. The boilers are two in number, of the Lancashire type, 6 ft. 6 in. in diameter by 20 ft. long; each having two flues 2 ft. 6 in. in diameter, and eight circulating cross-tubes.

The author proceeded to describe at considerable length the duty tests made with this plant, and the apparatus employed in carrying them out—concluding his statement by observing that he trusted he had been able to establish the assertion that, although the demand for high-duty pumping machinery has not been so keen in this country as abroad, owing probably to cheaper fuel, still, if exceptionally high-duty pumping machinery is demanded, the order may be confidently placed at home.

The discussion on the paper was directed mainly to the engine tests, which, owing to the space they would occupy, cannot be reproduced here. The report is therefore confined to a few of the general criticisms on the engine.

Mr. D. M. F. Gaskin (Nottingham) stated that he knew the conditions under which the engine was constructed; and he could assure the members that the whole of the matter in the paper had been derived absolutely from the tests of the Liverpool Corporation Water Department He had seen the engine; and it had a very handsome and compact appearance.

The President, having referred to the tests, inquired whether the governor was a really useful addition to the engine, or merely ornamental.

Mr. W. Matthews (Southampton), in the course of a criticism of the tests, said the total duty of the engine was mentioned as 131,730,000 foot-pounds per 112 lbs. of coal. This, of course, was very good indeed; but it seemed to him it had been obtained at the expense of putting in an engine which possessed a great deal of complication. An enormous amount of pain had been taken in jacketing, and all sorts of things; and certainly the engine did not seem to him to be of the simplest possible character. It was an engine that one might not hesitate to put down in a station where there were a number of others, and where a highly skilled man had the supervision of them. But he did not think it could be recommended for an isolated pumping-station, where the work had to be left to a great extent to a man who was paid only moderate wages.

Mr. Towler, in replying, said, in an installation of the kind described, the chance of sudden breakage was very remote; but he had confidence the governor was exceedingly sensitive. He dealt with Mr. Matthews' criticisms at great length; and remarked that, the higher the pitch to which a manufacturer brought an engine, the more disposed were people to say: "This is too good; we will not believe it." As to the engine being complicated, and liable to a great deal of wear and tear, he did not think there was much in it that would get out of order. If an engineer required a high duty, then he must have a complicated engine; but if he was satisfied with a lower duty, then he (Mr. Towler) would say by all means have a cheaper engine. But he could not have both.

The author was heartily thanked for his contribution.

The Sanitary Institute.—The preliminary programme of the sixteenth congress of the Sanitary Institute, to be held in Leeds, from the 14th to the 18th prox. has been issued. The President is Dr. R. Farquharson, M.P. The congress will include three general addresses and lectures. The sections will meet for two days each, and deal with (1) Sanitary Science and Preventive Medicine, presided over by Mr. T. Pridgin Teale, F.R.S.; (2) Engineering and Architecture, presided over by Mr. Lewis Angell; and (3) Chemistry, Meteorology, and Geology, presided over by Mr. W. Whitaker, F.R.S. There will be six special conferences, one of which will be on "River Pollution," presided over by Major Lamorock Flower; and another on "Municipal and County Engineers," the President of which will be Mr. T. Hewson. In connection with the congress, an exhibition of apparatus and appliances relating to health and domestic use will be held.

Proposed Electric Lighting Clauses Consolidation Bill.—The repetition, year after year, in Provisional Orders relating to electric lighting, of clauses having one common form, has led Mr. T. M. Healy to call the attention of the President of the Board of Trade to the subject, and to ask whether he would consider the desirability of bringing in a Public Bill containing model clauses dealing with electricity, on the principle of the Gas-Works and Lands Clauses Acts; and also whether his Department would endeavour to keep Irish Provisional Orders by themselves, instead of incorporating them in English and Scotch Acts. Mr. Ritchie replied that his attention had already been directed to the matter, and whenever an opportunity occurred he would introduce a consolidation measure of the kind mentioned. He promised that, as far as possible, Provisional Orders dealing with electric lighting in Ireland should be grouped in separate Bills.

The Disturbance of the Streets of Vienna.—The "Neue Freie Presse" recently gave a pitiful account of the state of the Vienna streets, now partially upturned for the laying of new gas-mains by the Municipality. It pointed out that only new tiny samples of the contemplated general breaking up of the streets had so far been vouchsafed to the inhabitants, yet even now traffic in many streets was almost at a standstill. It pictured vividly the deep gaping trenches and tall mounds of earth which border one side of many streets, and described them as veritable pitfalls for the traveller after dusk. The trenches had been ready in some cases for weeks, but the mains were not laid. The heaps of earth in dry weather provided a copious covering of dust for surrounding objects, and in wet weather made the streets a quagmire. The evils were largely due to hasty and ill-considered plans for the laying of the mains. It was promised that the work in the chief thoroughfares should be completed this year, in view of the great influx of strangers expected in 1898 for the Jubilee celebrations in the city; but the plans have been considerably upset through the subsequent adoption of a scheme for putting down electric tramways in several of the streets. The inhabitants cannot see any certain termination to the disturbance of the roads; and the leading tradesmen in the centre of the city have petitioned Dr. Lueger for a postponement of the main-laying in that quarter until the late autumn, as they foresee great loss of trade if it is carried out forthwith.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Manufacturing Wages of The Gaslight and Coke Company.

SIR,—In your editorial remarks on the 3rd inst. respecting the manufacturing wages of this Company, you draw an entirely wrong conclusion when you mention my name with reference to the observations I made at the late Engineering Conference when the question of water gas was under discussion. If you will be good enough to read the report of what I said, which appears in your own periodical, you will see that my remarks will not bear the construction which you have put upon them.

G. C. TREWBY,
Consulting and Constructing Engineer.

The Gaslight and Coke Company,
Horseferry Road, S.W., Aug. 6, 1897.

[We regret that Mr. Trewby should feel aggrieved at our remarks upon the carbonizing wages of The Gaslight and Coke Company; but we are at a loss to understand where our imputed misconstruction lies. Mr. Trewby certainly did say at the Engineering Conference that "where they had machinery, they did not find, when the interest on capital and the wear and tear were taken into consideration, there was a great saving over the ordinary hand labour." It was a statement likely to make an impression not easily lost; and the confirmation it apparently received from the latest accounts of The Gaslight and Coke Company was too striking to be overlooked. If Mr. Trewby will explain how we have misrepresented his views, we will gladly give prominence to the correction.—ED. J. G. L.]

The Determination of Sulphur in Spent Oxide.

SIR,—The method advocated by Mr. H. C. Page, in your issue of June 15, for the determination of sulphur in spent oxide, is neither original nor accurate. Oxidation by fusion with potassium chlorate is the foundation of a method described by Böckmann in his "Chemisch-Technische Untersuchungs-methoden" (1893), and introduced by him about 1882. The only points of difference between Mr. Page's and Herr Böckmann's methods are (*a*) the introduction of common salt by the former, "to temper the action;" and (*b*) the placing by the latter of a layer of potassium chlorate and sodium carbonate over the mixture of spent oxide, chlorate, and carbonate. But in all essential points the methods are identical.

The want of accuracy and reliability is shown in the following results, obtained by the use of the method on the same carefully prepared sample of spent oxide: 51·4, 65·2, 41, 48·8, and 56·2 per cent. The experiments were most carefully performed; taking the proportions mentioned by Mr. Page, and melting in a platinum crucible. The weak point in the method we found to be the distillation of the sulphur, which took place before the fusion of the chlorate could bring into action its oxidizing properties. In some instances, the blue flame of the burning sulphur could be distinctly seen at the mouth of the crucible. Again, we found that when the chlorate fused, deflagration of the organic contents of the spent oxide at once set in; and this no doubt would be responsible for some loss of sulphur. The deflagration invariably took place whether the heat were applied slowly or rapidly.

In these experiments I had the assistance of Mr. John Pemberton.

W. JACKSON, A.R.C.S.

Technical School, Tunstall (Staffs.), Aug. 3, 1897.

P.S.—With respect to the use of carbon bisulphide in the general method, I find a Sonhlet fat-extraction apparatus acts most efficiently, and is economical with respect to the bisulphide, besides reducing the disagreeable smell to a minimum; and the trouble from particles of oxide going through with the sulphur solution is entirely removed.

W. J.

Incandescent Gas Lighting at Ongar.—The Chairman of the Ongar District Council (Mr. R. Hayward) has offered to defray the whole of the cost of installing a system of incandescent gas lighting at Ongar. The offer has been accepted, and the laying of a new gas-main for the High Street has been commenced.

Water-Works and Lighting for Brazil.—In the United States Consular Reports for June there is quoted a letter from the French *Moniteur Officiel du Commerce*, which states that the attention of the industrial world should be called to the water-works which are being contemplated and executed in the province of Sao Paulo, Brazil, as well as to the plans for illuminating a number of the cities. San Carlos de Pinhal, with 12,000 inhabitants; Rio Claro, with 10,000: Araruquera, with 8000; Pirassununga, with 6000; Lemo, Descalvado, Brotas, and Porto Ferriera may be mentioned. In some 15 cities, the populations of which range from 5000 to 15,000, water-works are already in progress. According to a recent decree, all the cities of the province are obliged to provide themselves with drinkable water; and plans are being everywhere studied.

The Water Supply of Bishop Auckland.—At the meeting of the Durham County Council on the 28th ult., the Health Committee reported that, after considering, for upwards of four years, the representation made by the County Council, under section 19 of the Local Government Act, 1888, to the effect that the character of the present water supply of Bishop Auckland is dangerous to health, the Board had at last determined that they have no power under that Act to compel the District Council to obtain a fresh supply. The Committee therefore recommended that a representation be made to the Board under section 299 of the Public Health Act, 1875 (which gave them power), that the District Council had made default in providing their district with a supply of water, that danger arose to the health of the inhabitants from the unwholesomeness of the existing supply, that a proper supply of water could be obtained at a reasonable cost, and that the Board be called upon to exercise their powers under the last-named section.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Monday, Aug. 2.

METROPOLITAN WATER COMPANIES BILL.

Lord JAMES of HEREFORD, in moving the second reading of this Bill, remarked that at the commencement of last session the Government presented a Bill very different from the present, dealing with the water supply of London. It proposed to create a Water Trust composed of representatives of the London County Council and the outside areas which were supplied by eight Metropolitan Water Companies. The Government believed the Bill would produce a good effect. But there was not time to deal with it in the House of Commons. When the subject had to be considered by the Government at the commencement of the present session, they found that much had occurred during the recess. Representatives of the London County Council, or of the majority of that body, had approached the representatives of the outside areas. The County Councils outside had no power in relation to water supply within their own areas; but, approached by the legal representatives of the London County Council, they had made certain agreements with the latter. The Council being a water-governing body, while the County Councils outside had no control over water supply, the agreements were not legally valid without the approval of Parliament. But by means of them, the outside areas had secured terms so advantageous that they would never be likely to oppose any Bill the Council would promote for the purchase of the undertakings of the Water Companies. The Government offered to protect the interests of the outside areas; but the latter, having secured advantages by informal and invalid agreements, preferred not to be protected. While the Government felt that the control of the water supply should be in the hands of the local authorities, it had the great duty cast upon it to see that in the formation of a body representing those authorities the interests of the water consumers were carefully guarded. Looking at the matter practically, if the London County Council introduced Bills to acquire the property of the Water Companies, all the agreements entered into with the outside areas would have to be scheduled and considered by Parliamentary Committees; but this would not safeguard the public interests. The London County Council would appear on the one side, and the Water Companies on the other. *Locus standi* would, no doubt, be given to the representatives of the outside areas; but their support would have been secured. Technically, *locus standi* might be obtained for individual ratepayers to oppose; but where was the wise, patriotic ratepayer who would bear the enormous expense of appearing in the interests of the rest of the ratepaying community, and saying: "I protest against this Bill as casting undue expense upon us"? If the Government consented to the Bill going before a Committee, they could not be represented before it. Under these circumstances, the Government felt they ought to see that a full inquiry into the proposed arrangements for the distribution of water took place; and they had decided that the best and most impartial inquiry would be effected by means of a Commission. Such a Commission would not technically have the contending parties—the promoters of the Bills and the Water Companies, who had contended so often in respect of water supply—before them, but would have entirely the public interest. They would investigate matters which would never be inquired into by a Parliamentary Committee. They would consider what were the best governing bodies for the London County Council area and the surrounding areas; the most economical method of allocating the supply; and the practical feasibility of distributing the water. This would involve important engineering questions, and the consideration of how far, with eight Companies to deal with, having central works belonging to them, water could best be distributed in the eight different areas. A strong Commission had been appointed, presided over by a member of that House, and having many experts upon it who would bring their knowledge impartially to bear on these points. The Commission had already been sitting. Their appointment did not quite conclude the duty cast on the Government. The inquiry, and the legislation which would be founded upon the report of the Commission, would take time, but he hoped not a very long time. Complaints—whether well founded or not, he could not say—had been made from certain localities of insufficiency of supply and neglect on the part of the Water Companies. The Bill before the House sought to deal with any complaints that might be justly made, and to provide the public with a convenient practical remedy. It placed in the hands of the Railway Commissioners, who had had great practical experience in matters of duty, the power of hearing any complaint against the Water Companies which might be brought before them. They would have power, if the complaint proved well founded, to order the Company to fulfil their duty within a certain time, or pay a penalty for its non-fulfilment; and the great legal power of the Railway Commission—power of attachment against the property of the Company—could be put in force until that duty had been discharged. This was a new provision; and it was hoped it would cause the Water Companies to fulfil their duties to the utmost. It was proposed to give to the local authorities who would represent the London County Council within its area and represent the County Councils outside the area, power to make complaint, on behalf of the public, at the expense of the respective areas, to see that the causes of complaint should be entirely removed, and to advocate the cause of the public before the Railway Commission, until there could be no matter of complaint against the Companies. There were other provisions of a minor character in the same direction; but these were the two main proposals of the Bill. The Government submitted it as a practical measure of utility, and one which should be productive of great benefit to the water consumers of London.

Lord TWEEDMOUTH, while admitting that the Government could not deal with the whole subject pending the report of the Commission which was to inquire into the matter, expressed the opinion that they might have gone somewhat further in this temporary measure, and have reduced the extraordinary and peculiar privileges at present possessed by the eight Companies.

The EARL of WEMYSS was at a loss to understand why there should be all this talk about legislation. He should like to know from Lord Balfour whether, in his opinion, there was any necessity for legislation.

The Water Companies undertook the supply of water on certain terms which were ratified by Parliament; and what right was there to take from them without compensation the rights and privileges accorded to them by Act of Parliament?

Lord BALFOUR said there was nothing in the Bill inconsistent with the report of the Commission over which he presided. The reference to that Commission was to inquire whether there was water enough in the Thames and the Lea for the growth of London's population. The reference did not include the question of administration. The report of the Commission was as true that day as it was when it was signed; and it had well stood the criticism to which it had been subjected.

Viscount CROSS remarked that if Parliament had passed the Bill he introduced in 1880, there would by this time have been a satisfactory water supply for London.

The Bill was then read a second time.

Tuesday, Aug. 3.

To-day the House went into Committee on the Bill.

Lord JAMES of HEREFORD moved to amend sub-section 2 of clause 1, by giving power to the Railway and Canal Commission to award damages to the complainant in case of any complaint by a water consumer or a local authority as to the quantity or quality of the water supplied for domestic purposes.

The amendment was agreed to.

Lord TWEEDMOUTH proposed to add the following new sub-section to clause 1: "When in any quarter in which, owing to insufficiency of supply or pressure, fracture of mains, or any other cause than the default of the water consumer, water shall not have been supplied to any premises on every day, in accordance with the law, the owner or occupier of such premises may complain to the Railway and Canal Commission that such deficiency of supply has occurred; and the Commission, if satisfied that the complaint is well founded, may order the Company to repay to the water consumer the proportionate part of the quarter's water-rate paid for the days on which the supply was insufficient." He said this amendment was moved in Committee on the Bill in the other House by Mr. Holland; and, though it was defeated, it received a large amount of support. It was intended to remove one of the greatest grievances from which water consumers suffered—viz., that they should have to pay rates for water which had not been supplied to them.

Lord JAMES of HEREFORD did not think the sub-section necessary, as the amendment which had just been made to the clause gave power to the Commission to award damages to consumers who had not received water.

The Earl of KIMBERLEY thought it was a somewhat absurd arrangement to provide that a consumer could recover damages and at the same time have to pay rates for water he did not receive, and the non-receipt of which constituted his right to damages. He thought the Government should pluck up courage, and put an end to the most monstrous and grievous injustice from which water consumers suffered—that of having to pay for water which they never had.

Lord JAMES of HEREFORD said the criticism of the noble Earl applied with greater force to the amendment, which would give no power to the consumer to recover damages, but only the rates he had paid.

The amendment was negatived.

On clause 6,

Lord JAMES of HEREFORD said the Bill as it stood was to come into operation on Nov. 1. But as the question whether or not there was an adequate supply of water in East London was now being raised, the Government thought the Bill should come into operation at once. He therefore begged to move to substitute "the first day of September" for the date previously named.

The amendment was agreed to.

The Bill was then reported, with amendments, to the House. The report was received; and the Bill was subsequently read the third time and passed.

The following Bills, having passed through all their stages, received the Royal Assent last Friday, when Parliament was prorogued:—

Belfast Water Bill, Borrowstounness Water Provisional Order Bill, Cirencester Water Bill, Colne Corporation Bill, District Councils (Water Supply Facilities) Bill, Dundee Corporation Bill, Duntocher and Dalmuir Water Provisional Order Bill, East London Water Bill, East Warwickshire Water Bill, Fylde Water Bill, Gas Orders Confirmation Bills (Nos. 1 and 2), Gravesend and Milton Water Bill, Harrogate Corporation (Water Transfer) Bill, Harrogate Water Bill, Kingston-upon-Hull Corporation Bill, Leeds Corporation Bill, Leicester Corporation Bill, Llandudno Urban District Council Bill, Metropolitan Water Companies Bill, Newark Corporation Water Bill, Newport Corporation Bill, New River Company Bill, Nottingham Corporation Water Bill, Pwllheli Corporation Bill, Rhymney Valley Gas and Water Bill, St. Neots Water Bill, Salford Corporation Bill, Southwark and Vauxhall Water Bill, Swadlincote District Gas Bill, Tuxford and District Gas Bill, Tynemouth Corporation Water Bill, Water Orders Confirmation Bill, Weymouth Water Bill.

HOUSE OF COMMONS.

Tuesday, Aug. 3.

SOUTHWARK AND VAUXHALL WATER BILL.

On the order for the consideration of the Lords' amendments to this Bill,

Mr. STUART said the Bill had been so amended in the House of Lords as largely to remove his objections to it; it having been made clear that it was only a temporary measure intended to maintain the *status quo* for a limited period. However, the provision which directed the Southwark and Vauxhall Water Company to bring in a Bill next year to make their altered position permanent still remained. He was afraid that the preservation of this provision might prejudice the position of the opponents of the proposal; but as he believed the present measure was a necessary one, he should not offer any further opposition to it.

The Lords' amendments were then considered and agreed to.

EAST LONDON WATER SUPPLY.

Colonel LOCKWOOD put a question to the President of the Local Government Board as to a recent failure of the water supply at the East-end.

Mr. CHAPLIN replied that he had received a report on the matter from Major-General Scott, which stated that a large main supplying 10 million gallons of water per day from the Thames had burst in two places, and, as the effect, air had accumulated in the pipe, and greatly reduced the flow of water passing from the Hornsey Wood reservoir of the East London Water Company. The ruptures had, however, been repaired, and the accumulation of air gradually dispersed; and a full supply of water was renewed on the previous Saturday.

HOUSE OF LORDS COMMITTEE.

Monday, July 12.

(*Before Lord* WANTAGE, *Chairman, the Earl of* PORTSMOUTH, *the Earl of* POWIS, *the Earl of* BEAUCHAMP, *and Lord* CROFTON.)

SOUTHWARK AND VAUXHALL WATER BILL.

This Bill, to enable the Southwark and Vauxhall Water Company to increase the quantity of water they may take from the River Thames, came before the above-named Committee to-day. The proceedings in the Committee of the Lower House were reported in the "JOURNAL" for the 13th ult. (p. 114).

Mr. POPE, Q.C., Mr. BAGGALLAY, Q.C., and Mr. DU CANE represented the promoters. The other Counsel engaged were: Mr. J. C. EARLE, for the Vestry of St. Mary, Battersea; Mr. BALFOUR BROWNE, Q.C., Mr. WORSLEY TAYLOR, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; and Lord R. CECIL for the Middlesex County Council. An appearance was also reserved on behalf of the Corporation of Kingston-on-Thames and other local authorities.

Mr. POPE, in opening the case for the promoters, said the object of the Bill was to prevent the recurrence of such a disaster as had befallen the East of London a few years ago; and it was in its nature and provisions a measure merely of a temporary character, and one which had been agreed to by the authority charged with the care of the River Thames. If there was not to be a water famine in half the district supplied by the Company, the Bill must—he put it as strongly as that—receive their Lordships' sanction. The water which the Company needed for their district was drawn almost entirely from the Thames. The Company had an agreement with the Thames Conservancy Board, under which, for a certain money payment, they were entitled to take 24½ million gallons of water daily. But the Company held, until January last, that under previous powers they were entitled to draw in excess of this quantity what was necessary for the wants of their consumers. The actual amount required for the supply of the district was, roundly, 45 million gallons a day. There had been occasions in dry weather when they had drawn as much as 41 million gallons per day from the Thames; their average draught from the river being 37 or 38 million gallons. If, therefore, they were confined to the quantity mentioned in their agreement, there must be a deficiency of from 13 to 15 million gallons a day, which would amount to a water famine. In January last, the Thames Conservancy obtained an injunction restraining the Company from taking more than the 24½ million gallons. Under these circumstances, the Company could only negotiate with the Conservancy Board because they could not face the contingency of not supplying the district with the water it needed. The result was the promotion of the present Bill, the object of which was, for the space of two years, and with the consent of the Conservancy Board, to legalize the action of the Company in taking from the river the water that was necessary for the supply of their district, subject to certain conditions which would ensure a sufficient flow in the river. This water was to be paid for; and though the Company thought the sum large, in view of their great necessity they did not argue about it. In addition, the Conservancy Board put upon the Company terms binding them, in the session of 1898, to introduce a Bill for the obtaining of such statutory powers, the raising of such capital, the acquiring of such land, and the constructing of storage reservoirs and such works, within eight years from the passing of the Act, as might be necessary for the taking of a quantity of water from the Thames sufficient to enable the Company to fulfil the obligations imposed upon them by statute for the supply of water within their limits. The Conservancy recognized that the hand-to-mouth method of drawing from the river might result in injury to the river itself; and that the proper method of dealing with the water was to follow the recommendations of the Royal Commission—viz., to construct and maintain reservoirs of sufficient size to contain water taken from the Thames in times of surplus and flood, and not to interfere with it when doing so might be harmful or serious. The House of Commons Committee fully recognized the urgency of the case. Before the Committee a good many questions were raised and discussed; but the view taken by the Committee was that this was a temporary measure to provide for an emergency, and that the proper time to raise some of the important questions dealt with in the petitions would be when the Company came to Parliament again next year. Counsel put it to the Committee that this was the right view to take now; for he did deprecate any discussion which might put the Company in the position of being unable to supply their consumers. They were asking for no extra capital, works, district, or powers of supply—but simply that they might do legally what they had hitherto been doing illegally. Coming to the petitions, he said the real objection of the London County Council was to clause 4, providing for the supply from the Thames. This, they seemed to think, prejudged the question of the advisability of taking any water from the Thames; and they suggested that if the Bill were sanctioned, it would look as if there were a parliamentary declaration that the future supply should be taken from the Thames. He did not, however, adopt that as a possible construction of the clause, because it was the intention of the Company to leave the question open for full discussion next year. Then the County Council said if the Company could

not supply their district, two other Water Companies—the Chelsea and the West Middlesex—who also had power of supply in portions of it, could undertake the work. But these Companies had no mains in the promoters' district; and if they had, there was no water to spare. If, therefore, the solution of the problem were sought through these Companies, the district would have to go short for at least a year while the necessary mains were being laid—even supposing the water could be procured. The Battersea petition was very similar to that of the County Council. They said they could get a better supply from the West Middlesex Company; and that therefore they were not anxious that the Southwark and Vauxhall Company should have the power of supply. His answer to this was that next year they would have an opportunity of saying they preferred West Middlesex water; but that now they could not get it, and so they had better take the water from the Southwark and Vauxhall Company than none at all. The Kingston Corporation and the Middlesex County Council petitions related chiefly to the mains, which, they said, were laid in their district in such a way as to constantly leak; and they urged therefore that the Company ought to be put under terms to relay them. There was no reason for their apprehending, after the passing of the Bill, any greater leakage than now existed, because no more water would be sent through the mains, nor would the pressure be greater than at present. There was occasional leakage in the mains in these districts; but this arose from the nature of the subsoil in which they were laid. It was a matter that should be dealt with next year, for it had no relevancy at all, he submitted, to the question they were now discussing. He urged that the view of the Commons Committee was right—namely, that the matters contained in these petitions were not such as should be urged upon a temporary Bill, that the present Bill should be passed for two years, and two years only; and that all these questions, which would be very relevant next year, should, owing to the urgency of the case, be postponed till then.

Sir *H. E. Knight*, Chairman of the Company, examined by Mr. Pope, said the Company were of opinion that the Act amalgamating the Southwark Company and the Vauxhall Company in 1852 gave them power to take water from the Thames without limit as to quantity. They had an agreement with the Thames Conservancy, under which they were empowered to abstract up to 24½ million gallons a day, for which they paid an arranged sum. But beyond this they thought they could also take what was necessary for their consumers. The greatest quantity drawn in any one day was nearly 41½ million gallons; but they could not, with safety, depend upon a smaller limit than 45 million gallons—the quantity named in the Bill—because they had always to provide for the maximum, not the average, demand. The provision for the construction of reservoirs was merely carrying out the recommendation of the Royal Commission, so that the Thames might never be depleted of water to the detriment of other interests. After the granting of the injunction, absolutely the only thing left to the Company was to come to Parliament with the present Bill.

Cross-examined by Mr. Worsley Taylor: The Company were pledged to come to Parliament next year with a Bill which would contain a complete scheme for the future supply of their district; and the Bill would be open to the fullest possible discussion. It was not intended by the present measure to in any way prejudice questions which might then be discussed. He was not prepared to modify the Bill by the removal of clause 4. The Bill authorized the Company, not only to continue to take the water, but to make a payment for it. At present they were not paying for the excess quantity they were taking. The question of payment was settled in the present Bill; but it could be discussed again next year. The County Council had raised the question, as a matter of principle, that there should be no further draught from the Thames; but this was answered by the report of the Royal Commission. He was not aware that the County Council had also raised, as an important question, the contention that there should be no payment to the Thames Conservancy at all; and that, if there were, it should not be paid by the water consumers. The consumers in the promoters' district received the best and cheapest supply possible.

Mr. Worsley Taylor: If your Bill prejudices their right to get a better and cheaper supply than that which you now give, do you think your Bill is wrong?

Witness: I do not see how the Bill can do anything of the sort. Witness added that he knew the West Middlesex Company had power to supply in his Company's district, but not so long as his Company were giving a supply.

So soon as you are unable to furnish water to the inhabitants of the district also supplied by the West Middlesex Company, the consumers have power to call upon the West Middlesex Company to supply them?—Yes; and after five or six years they might do it.

Witness, in further cross-examination, said it was not true that the West Middlesex water was better than that of the Southwark and Vauxhall Company. Last month's reports showed that his Company's water was better than that of any other Metropolitan Company. For some classes of houses, the Southwark and Vauxhall charges were higher than those of the West Middlesex Company. The Kent Company also had power to supply in a portion of his Company's district; but the Company had power to make an extra charge of 10s. for water-closets. The Lambeth Company, too, had power to furnish water to his Company's district; but their charges were much higher. Save for very trifling differences, the water supplied by all the Metropolitan Companies was equal. In 1896, his Company supplied at the rate 38·3 gallons per head per day. He could not compare that with the supply of other Companies; and he was not aware that it was more than they supplied. No one looked after the prevention of waste so much as the Southwark and Vauxhall Company.

By Mr. Earle: The Southwark and Vauxhall and the West Middlesex Companies had power to supply Battersea; but as long as the former gave a supply, the latter Company could not. The Southwark and Vauxhall maximum charge was 5 per cent. on the rateable value; and that of the West Middlesex Company was 4 per cent. His Company were not entitled to charge for baths in houses rated at less than £30; while the West Middlesex Company could charge 4s. for baths in all houses. Houses rated under £30 were about 81 per cent. of the total in Battersea. Nearly all the houses under £30 had baths, he believed; but he had no definite information on the point. He did not think the West Middlesex Company could make any charges in excess of those of the Southwark and Vauxhall Company, except the 4s. for baths. His Company were charging their full percentage; but the West Middlesex were a rich Company, and were not charging their maximum. The conditions of the two Companies were so utterly different that it was impossible they could charge alike. His Company last year supplied water to 891,000 persons; and the complaints averaged 2½ per day.

By Lord R. Cecil: The injunction had been suspended for a year.

Mr. Pope, in reply to Lord R. Cecil, said the application to the Court was to restrain the Company from taking more than the 24½ million gallons daily. The injunction was in the terms of the prayer. The Company then negotiated with the Conservancy Board, who agreed to suspend the order for a year with the definite purpose of allowing them to make the present application. If the Bill failed, the Board would proceed to enforce the injunction.

Lord R. Cecil said his point was that substantially there were no means of enforcing an injunction of this kind.

Witness, in further cross-examination, said he had not been into the question as to whether, having done their best to obey the injunction and failed, there were any means of enforcing it. He did not know that sequestration was the only way. For years the Company had been attempting to prevent waste. He knew the main under the Hampton Court Road, which had been laid four or five years. He thought it very likely that there had been as many as 210 separate takings up of the road to repair it during that time. The reason the pipe leaked was the shifty nature of the subsoil. The main was laid originally to the satisfaction of the Surveyor to the Middlesex County Council; and the Company had a certificate to that effect.

Re-examined: He did not see how the Bill could affect the main, because the Company would take no more water than now. It was leaking less from month to month, because, as soon as a leak was discovered, it was repaired. Sir F. Dixon Hartland told the Committee of the House of Commons that he would enforce the injunction if the Bill were not obtained; and witness thought he would.

Tuesday, July 13.

Sir *H. E. Knight*, was this morning re-called at the request of the Committee, and examined as to the agreement between the Company and the Conservators. There was nothing in it providing that if the present Bill were thrown out the Company would be able to pump the quantity they required from the river. If the Bill were lost, the Company could not go on pumping more than the 24½ million gallons a day.

Mr. Baggallay then read the terms of Mr. Justice Mathews' decision, and explained how the agreement, which was merely verbal, came to be made between the Board and the Company for the promotion of the present Bill; the Board agreeing to suspend the injunction for a year for the purpose.

Sir *F. Dixon Hartland*, M.P., in reply to Mr. Baggallay, said he was Chairman of the Thames Conservancy Board. He was taken at length through the history of the Company and the Conservancy Board, the main points of which have already appeared. Under the Bill promoted by the Conservators in 1894, for the consolidation of their Acts, it was provided that no Company should be allowed to take more water than they were legally entitled to take at a particular day anterior to the passing of the Act. It was subsequently found that the promoting Company were taking more than 24½ million gallons, which was all they were entitled to take on the particular day. Witness went to the Board of Trade, to take their advice as to what steps to adopt; and they told him he was bound to proceed against the Company. He therefore had no option but to do so. If Parliament did not pass the present Bill, the Conservancy Board would be obliged, and intended, to enforce the injunction. The payment to the Conservators for the water was merely in respect of the preservation of the flow of the river, and the carrying out of works for its purification. In times of big flood, more water flowed over Teddington Lock in two or three days than was taken by the whole of the Companies in a year.

Cross-examined by Mr. Worsley Taylor: If Parliament declined to pass the present Bill, and even if a water famine were imminent, the Board would certainly enforce the injunction. He knew one contention of the London County Council was that there was sufficient water taken by the combined Metropolitan Companies to supply the whole of their districts, if they exercised their interchange powers. But this argument was valueless, because there was not enough water to spare from the other Companies to supply what the Southwark and Vauxhall Company required. The amount the Companies at present took, he believed, was 130 million gallons a day; and the quantity consumed 134 million gallons. The further contention of the County Council, that the Southwark and Vauxhall Company's charges, all round, were 25 per cent. higher than the West Middlesex Company's, was entirely wrong.

Witness was also cross-examined by Lord R. Cecil, as to the bad condition of the road at Hampton and Hampton Court, where the Company's large main was laid; and he agreed that the bad state of the road was caused by the mains.

Mr. *J. W. Restler*, Engineer to the Company, examined by Mr. Du Cane, said for the past ten years 24½ million gallons a day had been insufficient for the supply of their district. The consumption had now reached over 41 million gallons on a particular day; and with the increasing use of water, it was practically certain that the Company would soon require 45 million gallons a day as a maximum consumption. The Southwark and Vauxhall water was quite as pure as that of any other London Company. The West Middlesex and Lambeth Companies had power to supply in the Southwark and Vauxhall Company's Battersea district; but neither of these Companies could give water there without further parliamentary powers, because they were already within a few hundred thousand gallons of their maximum supply, and they had not the necessary mains. With reference to their great main in the Hampton Court Road, he explained that the leaks were due to the subsoil being fine running sand. The water in the soil passed along the old trench, and washed the support from under the pipes, with the result that a pipe here and there settled and leaked. The main when laid was approved by the County Council Surveyor. He had had several of the leakages gauged, and found that the average amount was about 10 gallons an hour, which was very small. It was daily growing less. The Company had offered to pay the local authorities for the repair of roads opened in order to deal with this main, the maximum amount paid to any other local authority; but they were asked to pay five times as much,

which they declined to do. After the injunction was obtained, all the other Metropolitan Water Companies were communicated with; and all save one said they had no water to spare. The one exception said they might supply a little for a brief period, but subject to their being able to withdraw it on short notice.

Cross-examined by Mr. FREEMAN: Prior to 1886, the Company's storage was rather short. At present, the actual storage was sufficient for about five days' consumption. That was practically no storage against the river. The Company would soon have another reservoir, which would give storage sufficient for ten days' additional.

Cross-examined by Lord R. CECIL: In every place where a leak had occurred since 1893, concrete blocks had been placed under the main. It was quite possible to lay a water-tight main in the subsoil where the leaks occurred.

Mr. BAGGALLAY said this closed the case for the promoters. He added that, if it would meet the opposition of the petitioners, he was prepared to accept words in the Bill clearly stating that nobody should be prejudiced, except the Conservancy Board and the Company, by the present measure; but he could not agree to clause 4 being struck out.

Mr. WORSLEY TAYLOR, in opening on behalf of the London County Council, said if the Bill merely legalized the taking of a supply which the Court had held to be illegal, and would prejudice no question that might be legitimately raised next year, the County Council would not be opposing it. But the Council maintained that the Bill—and especially clause 4—would materially prejudice a number of questions; and therefore they were obliged to oppose it.

The CHAIRMAN said the feeling of the Committee was that the power as to the water supply might fairly be given. But they wished to be informed as to how far the Bill would prejudice the questions which would have to be dealt with hereafter.

Mr. WORSLEY TAYLOR proceeded at considerable length to indicate points which, he contended, the present Bill would prejudice. First, there was the question whether the West Middlesex and the Kent Companies ought not to supply in the Southwark and Vauxhall Company's district, so far as the latter Company were unable to do so. This was very important, because his evidence was to the effect that the charges of these two Companies were lower, and their water better, than that of the Southwark and Vauxhall Company. Then there was the matter of intersale. The total quantity of water the Companies were now authorized to take, including the full amount under the Staines Reservoirs Act, was 175 million gallons; whereas the total draught at present was 113 million gallons—leaving a margin of about 60 million gallons. The present quantity was sufficient for all the Companies. Yet they sought in the Bill to authorize a further 45 million gallons. The Council feared that this would prejudice the point that there ought to be no further draught from the Thames—first, because there was sufficient margin under the intersale powers, and, secondly, because if more water was wanted it should be taken from other sources. There was the further point as to whether, supposing more water should be taken from the Thames, there should be any payment to the Conservancy Board for it; and, more important still, whether, assuming any further payment was necessary, it was right that it should be made by the consumers, seeing that the Conservancy's first duty was to provide for the navigation of the river. Counsel went into these and other points; asserting that in many respects the Bill would prejudice various questions. If the promoters were willing to make it quite clear that the measure was to be temporary, and for the sole purpose of legalizing the overdraught—that it would not in any way prejudice any questions—the County Council were willing to agree to the measure; or, if they could not agree, to take the matter before the Chairman of Committees of the House of Lords.

Mr. BAGGALLAY said he was prepared to insert in the Bill the words: "Nothing in this Act shall prejudice or affect any question which any body or person, other than the Conservators and the Company, may at any stage of such Bill desire to raise, with respect to the said Bill or any of the provisions thereof." This would leave it open to everybody who, under the ordinary rules of the House, had any right to be heard upon any stage of the Bill, without any prejudice whatever.

Mr. WORSLEY TAYLOR said that would not meet him, because, for instance, it would fetter discussion before the Royal Commission.

Ultimately Mr. Baggallay handed the Committee a paper, on which, to meet the objection of Mr. Worsley Taylor, he had written the provision given above, to which he now proposed the further addition of the words: "or may desire to raise before the Royal Commission on Water Supply in the districts within the limits of supply of the Metropolitan Water Companies, or may desire to raise elsewhere."

Mr. EARLE, for the Battersea Vestry, said his district was now supplied solely, or almost solely, by the Southwark and Vauxhall Company, though it could also be supplied by the West Middlesex Company. The Vestry held that they got worse filtered water and had to pay more for it now than they would if the latter Company gave them a supply. It was important therefore that, if possible, they should be supplied by the West Middlesex Company. Under certain conditions the Vestry had a right to force the West Middlesex Company to give a supply; one condition being the failure of the Southwark and Vauxhall Company to do so. The Vestry therefore very strongly objected to the preamble, where it was over and over again suggested that the Southwark and Vauxhall Company were under statutory obligation to supply their district. The whole of the preamble was absolutely unnecessary.

General discussion then took place as to the form of the preamble; and eventually

Mr. BAGGALLAY said he would cut it down to the words: "Whereas it is expedient that provision be made as hereinafter appears. And whereas the object of this Act cannot be effected without the authority of Parliament." There would then be slight consequential alterations; and in paragraph 4 he was prepared to insert the two amendments he had already indicated.

These suggestions were accepted in the main by the various parties. The room was then cleared; and on the re-admission of the public,

The CHAIRMAN said: The Committee have decided that the Bill may proceed, subject to the preamble as agreed; and that the words suggested by the promoters should be inserted, and other small amendments which have been added to the Bill be made.

Evidence was then taken on the petition of the Middlesex County Council. Mr. *J. Bigwood*, M.P., an Alderman of the Middlesex County Council, Mr. *J. Kemp*, Surveyor to the Hampton Urban District Council, and Mr. *J. D. Horsfield*, Surveyor to the Hampton Wick Urban District Council, all testified to the deplorable condition of the road from Hampton Ferry to Kingston Bridge, which was attributable, they held, to the leaky condition of the main.

Wednesday, July 14.

Lord R. CECIL to-day addressed the Committee on behalf of the Middlesex County Council; urging that the Company had so acted in connection with their water-main as to destroy his clients' roads; and that before the Company were given any further powers by Parliament they should be placed under terms to put and keep the roads in repair, and to reimburse the authorities the expense to which the Company had put them in the past by their negligent and improper conduct. He submitted a clause embodying this proposal; and in reply to the contention that the insertion of such a special clause was unprecedented, he asserted that, also, there was no precedent for the conduct of the Company.

Mr. BAGGALLAY having replied,

The CHAIRMAN, after brief consultation with his colleagues, said the Committee were prepared to accept the clause submitted by Lord R. Cecil so far as it related to the restoring and repairing of the road and the keeping of the main in proper repair, but not the part dealing with the reimbursement of the authorities for past expense.

The clauses were then adjusted; and the Bill was ordered to be reported to the House for third reading. This took place on the 29th ult.; and the Bill was returned to the Commons.

LEGAL INTELLIGENCE.

JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

Thursday, Aug. 5.

(*Before Lord* MACNAGHTEN, *Lord* MORRIS, *Sir* R. COUCH, *Chief Justice* WAY, *and Sir* H. STRONG.)

The City of Montreal v. The Standard Light and Power Company.

This was an appeal from a judgment of the Court of Queen's Bench for Lower Canada of Oct. 3, 1896, affirming a decision of the Superior Court for Quebec (see *ante*, p. 275).

Sir E. CLARKE, Q.C., Mr. L. J. ETHIER, Q.C. (of the Canadian Bar), and Mr. J. R. PAGET appeared for the appellants; Mr. HALDANE, Q.C., and Mr. R. C. SMITH (of the Canadian Bar) represented the respondents. The latter were not called on.

Lord MACNAGHTEN, in giving their Lordships' considered judgment, said: On the 10th of September, 1896, about half-past two in the afternoon, workmen in the employment of the respondent Company or their contractors broke up the surface of St. Antoine Street, in Montreal, and began to excavate the soil to lay underground wires along the street. The City Surveyors and the police officials, under instructions from the Municipal Council, interfered by force, and compelled the men to abandon their operations. Next day the respondents filed their petition in the Superior Court for an injunction to restrain the city from interfering with their contractors and workmen. Mr. Justice Tait granted an injunction subject to a temporary suspension of the order. The city immediately appealed to the Court of Queen's Bench for Lower Canada. The appeal came on to be heard on the 25th of September; and on the 3rd of October the Court delivered a unanimous judgment dismissing the appeal with costs. From that decision the present appeal has been brought. Their Lordships have before them the reasons of Mr. Justice Tait and the opinions of Sir Alexander Lacoste, C.J., and Wurtele, J., in which the other learned Judges concurred. They agreed entirely in the conclusion at which the Provincial Courts arrived and the reasons assigned for that conclusion. The respondents were incorporated in 1892 under the name of the St. Henri Light and Power Company, by the Act 55 & 56 Vict., cap. 77. It is only necessary to refer to four sections of this Act. Section 5 empowers the Company to manufacture and deal in electricity, gas, and other illuminants, and proceeds to declare that the Company "may lay its wires . . . underground as the same may be necessary and in so many streets, squares, highways, lanes, and public places as may be deemed necessary for the purposes of supplying electricity and gas for light, power, and heating; the whole, however, without doing any unnecessary damage, and providing all proper facilities for free passage through the said streets, squares, highways, lanes, and public places while the works are in progress." Section 6, which is now replaced by a more elaborate enactment, empowers the Company to erect posts and supports for conducting their wires overhead. Section 18, which is still in force, is in the following terms: "Before commencing the laying of wires or pipes or the erection of water-ways, the Company shall make a report to the Commissioners of Agriculture and Public Works of the province of such works, and shall send a copy thereof to the Council of the Municipality in which such works are so projected." Section 25, which is now repealed, declared that "the Company may only exercise the privileges conferred upon it by the present Act upon complying with the rules and regulations which exist or may be hereafter adopted by the municipal authorities on the subject." The Act of 1892 was shortly afterwards amended by the Act 56 Vict., cap. 73, by which the name of the Company was changed to "The Standard Light and Power Company." Section 25 of the Act of 1892 was repealed altogether, and section 6 was replaced by an enactment as follows: "The Municipal Council in all cities, towns, or incorporated villages, if they deem necessary, shall have the right to oversee and prescribe the manner in which . . . . streets, roads, and highways shall be open . . . . for the placing of wires underground." The combined effect of the two Acts, therefore, was that, having made the report required by section 18 of the Act of 1892, and having sent a copy to the Municipality in which the proposed works were projected, the Company became entitled to lay their wires, subject to the right of the Municipal Council, if they deemed it necessary, to oversee and prescribe the manner in which the streets were to be opened for the placing of the wires underground, and subject, of course, to the general provisions granted by the Legislature for the convenience and safety of the public. On May 15, 1896, the Company sent to the Municipal Council a notification

referring to the right of supervision which was reserved to the Municipality, and intimating that they intended to exercise the powers conferred upon them for laying underground wires for the purpose of conveying electricity through or along certain streets in the city of Montreal, including St. Antoine Street. On Aug. 22, 1896, the Company duly made a report to the Commissioners of Agriculture and of Public Works of the works they proposed to commence in the city of Montreal, with a plan annexed; and on Aug. 24, they sent a copy of the report and plan to the Municipal Council, requiring them within ten days to prescribe the manner in which the streets mentioned in the report were to be opened, and stating that in case of dispute they would proceed with the works (taking all due precaution), and would lay their wires underground according to the report, without doing any unnecessary damage, and providing all proper facilities for free passage while the works were in progress. No notice whatever was taken of this communication; and so on the 10th of September the works were commenced, and then the proceedings took place which led to the present litigation. He went on to say that their Lordships were unable to find any justification in law for the action of the appellants. The language of the Legislature was too plain to leave room for argument. The appellants, indeed, contended that it was hardly possible to conceive that the Legislature could have meant to confer such extraordinary powers upon a mere trading company as to authorize them at their will and peasure to interfere with public streets the care of which was committed to the Municipality; and they suggested that section 5 of the Act of 1892 might be construed as defining the objects of the Company, and enabling them to lay down their wires provided they first obtained the consent of the Municipality. It was true that the section did not in express terms authorize the Company to open streets. But this power was plainly involved in the authority given to them to lay their wires underground; and it was impossible to read section 25 of the Act of 1892 without seeing that section 5 conferred upon the Company powers and privileges which but for section 25 they would be at liberty to exercise without interference from any quarter. Then it was argued that the Company were bound to give the Municipality reasonable time for considering their plans; and it was urged that a period of ten days was much too short a notice for a great municipal body, which must necessarily proceed in a somewhat leisurely fashion. Regular council meetings, it was said, were only held once a month; and, although a special council could be summoned at two days' notice, the respondents could hardly expect the Municipal Council of Montreal to depart from their ordinary course for their convenience. There was, however, nothing to be found in the Act justifying the position taken up by the Municipality; and, considering that as early as May the Company gave formal notice that they intended to exercise their powers (although certainly the notice was not one which the Municipal Council were bound to recognize), it was plain that provision might easily have been made for the emergency, even if the Council could not bring themselves to summon a special meeting for such an occasion. When it was urged, on behalf of the Municipality, that the Legislature would not intentionally have put upon them the indignity of subordinating their authority to the ends and purposes of a trading company, it might be replied that the Legislature did not seem to have anticipated any friction or jealousy between two bodies which might be expected to work together for the benefit of the public. The amending Act, which repealed section 25 of the Act of 1892, expressly authorized municipal corporations to take shares in the Company, and aid the Company by bonus loans or advances, by guaranteeing the payment of bonds, or by granting such privileges and exemptions as the Council of any such Municipal corporation might deem advisable. Their Lordships were of opinion that the respondents acted within their powers in opening St. Antoine Street; that the Municipality were not justified in obstructing their works; and that the injunction was properly granted. Their Lordships would therefore humbly advise her Majesty that the appeal ought to be dismissed. The appellants would pay the costs of the appeal.

HIGH COURT OF JUSTICE—OFFICIAL REFEREE'S COURT.

Lincoln's Inn—Friday, Aug. 6.

(*Before Mr.* E. POLLOCK.)

Ward v. Plymouth Gas Company—The Alleged Nuisance at the Plymouth Gas-Works.

To-day the hearing of this case, which was before the Official Referee at Plymouth early in May, and again from the 29th of June to the 9th ult. (see Vol. LXIX., p. 1141, and *ante*, pp. 47, 117), was resumed in London.

Mr. M'CALL, Q.C., and Mr. GRAHAM appeared for the plaintiff; Mr. CHANNELL, Q.C., and Mr. DUKE represented the Company.

Mr. DUKE, in summing up the defendants' case, said the substantial question was whether, since the completion of their new works, there was an actionable nuisance to the plaintiff. There was the question whether the nuisance had existed since the last inquiry, and there was one material fact which showed what the condition of things was before Oct. 24, 1896—viz., that Adams, the foreman, stated that at no time in the summer of that year did the plaintiff stop his machinery. There were other questions—whether the defendants had abated the nuisance wholly or partially, either since the date of the last inquiry, in April, 1896, or since Oct. 24; and the question of damage, which was not proceeded with. But the main question was whether there had been, and now was, an actionable nuisance caused by the defendants in their works to the plaintiff in his. That the whole of the questions were but one, appeared from the nature of the evidence with which the plaintiff supported his case—viz., that the condition of things had been bad at all times since then, and that it had been as bad since October, 1896, as it had been at any time. On the last occasion, when the Court sat at Plymouth, the plaintiff was recalled for cross-examination; and before being cross-examined, he tendered this further evidence—that between May 8 and June 29 the nuisance of which he complained had continued. The chief matters of which the plaintiff complained were soot, coke dust, and fine dust, which was alleged to come from the retort-house, particularly from the chimneys, and the interstices of the corrugated iron roof of the retort-house. The nature of the plaintiff's case being continuous nuisance, rather worse than better, going on from 1894 to the present date, it became material to examine into the evidence by which he supported his case. First of all, Mr. M'Call relied upon the fact that the defendants had submitted to judgment in an action in the High Court admitting a nuisance, which it was denied existed at the present time, and that the defendants had paid a sum of £3200 for damages. His learned friend appeared to draw from the fact the comforting conclusion that a nuisance which had once existed must be taken to exist in perpetuity.

The OFFICIAL REFEREE said he did not think there was anything in that with regard to the present inquiry.

Mr. DUKE said he should have submitted that it was rather in the defendants' favour, as showing that they had honourably met Mr. Ward's claim by the payment of a substantial sum of money, and had set themselves to work to devise means for preventing a possibility of any nuisance in the future.

The OFFICIAL REFEREE did not think that payment into Court was any admission of a present nuisance.

Mr. DUKE said, with regard to the evidence of the plaintiff and the witnesses in his own employment, it could be tested by the statement which the whole of them made, that in this summer there had been on the plaintiff's premises a nuisance proceeding from the defendants' works which was as bad as anything which had existed since those works were erected. Each of these witnesses came forward to deliberately support this assertion; and it was a declaration which no doubt appeared to them to be necessary to carry the plaintiff's case. There was one other fact with regard not only to the plaintiff's evidence from within his works, but also with regard to his professional witnesses, and that was that it depended on the credibility of George Adams, who was the plaintiff's main witness within his own works. George Adams provided every sample upon which evidence was given, until, during the inquiry, the Official Referee caused independent samples to be taken and tested. The plaintiff's case rested upon George Adams in the main—he was the plaintiff's representative in every step and act which was taken from 1894 till 1897. Adams had been very actively engaged in producing evidence; and all the matters recorded in his diary were relative to the present inquiry. There was a crucial time in this matter with regard to Adams, and likewise with regard to the business on which he was employed—namely, December, 1895, or near then. It was about that time, or not long before, that the Directors of the Gas Company had completed the first batch of improvements by means of which they removed the causes of complaints with regard to the sulphate works, and the forced blast of the chimney, which was driving dust over the neighbourhood. It came to the knowledge of the Directors that, on a day which could not be identified at the moment, a man named Jones, who was in respectable employment and of unquestionable character, said he saw George Adams, while the other men were absent from the plaintiff's works, and while he was supposed to be absent, going round to certain pits which had always been the subject of observation by the professional witnesses who had been called, and sprinkling something upon the pits from a small box. This witness, after he had had his breakfast, went again to the pits, and saw a quantity of fine black dust, which left no doubt in his mind that Adams was guilty of producing fraudulently the appearance of a fall of dust on those pits. This dust was sprinkled on the pits for the purpose of being shown to the persons who came there to qualify to give their evidence. A very remarkable thing happened, which proved beyond question, by one of those coincidences which were the test of evidence, the truth of what that witness stated. He said he could not tell the day that this thing happened; but his recollection was that it was on the Friday before Christmas, 1895, which was the very day that one of the professional witnesses (Mr. Fletcher) called for the purpose of gleaning information for his evidence. If all this were true, it put George Adams's evidence out of the case. It did not rest on what Jones saw, but another piece of evidence came forward which was quite unsought as far as the Directors of the Company were concerned, because they had resisted the suggestion forced on them from various quarters that there was unfair play going on. Young M'Farlane, on the matter of the alleged nuisance being talked about, had been heard to say that if he told what he had seen it would show something. He came before the Court, and told his story with a circumstantiality and vividness that he (Counsel) did not think anyone who saw him would be likely soon to forget. M'Farlane said that he went into Mr. Ward's employment in the summer of 1896, at which time he (M'Farlane) was living with the witness Adams; that at that time Adams was accustomed to go upon the roofs to collect fine dust, and to dry it on a stove; and that the dust which Adams so collected was kept in a box behind the rolling-machine. To that box Adams would resort when witnesses were coming to inspect the works, and would sprinkle upon the rolling-table and the exposed places about which evidence had been given a sufficient quantity of the fine dust to make the appearance of a nuisance. He would then brush out of it the large particles of dust or lime which happened to be in it; and where it had fallen unevenly he would blow it. M'Farlane's evidence was that this happened some 14 or 15 times in the summer of 1896; and when George Adams was away in London in connection with this case, and Jim Adams took his place, he (Jim Adams) went through the same performance. Having sprinkled the tables and dusted them with the dust which he took from the same source, he called young Mr. Ward and showed him that there was a nuisance; and Mr. Ward directed the machinery to be stopped. Some attempt had been made to damage young M'Farlane's credit; but this had not succeeded. It did not depend entirely on what Jones and M'Farlane said. If M'Farlane's story stood alone, notwithstanding its clearness, vividness, and circumstantiality, it might be said that there was a doubt whether Adams or M'Farlane was to be believed. But something else had happened with regard to the matter of the dust. Mr. West was on the plaintiff's premises with other witnesses in the summer of 1896; and a question arising with regard to the dust, Mr. Ward suddenly said: "Oh, if you want dust from the roofs, I can show you dust from the roofs." He then called for a box; and, said Mr. West, it was a long time in being found. But, while the box was being looked for, he saw a box in the immediate proximity of the rolling-machine. Someone drew something back that was over it; and it turned out to be a box of dark shiny dust, hollowed out in the centre as though some had been taken out from it. This was strong corrobo-

ration of M'Farlane's story. A great deal of mystery had been thrown over the various boxes produced in the case. First their existence was denied by Adams, and then one by one they were admitted. At first the story was that there were no boxes behind the rolling-machine; and then that there were two boxes, both of them nailed down. The professional witnesses came and gave their analyses of the samples supplied them; and at times there were enormous amounts, in proportion to the bulk of the sample, of that black dust which Jones and M'Farlane said Adams produced by sifting, and which he used when he thought fit to sprinkle the pits or to prepare samples for the purpose of examination by witnesses. There was evidence in the case with regard to the manufacture of the alleged proofs of the nuisance which would be sufficient to convict Adams, if he were indicted, of a misdemeanour arising out of the accounts to which the two witnesses he referred to deposed. If a charge were preferred against Adams of misdemeanour, by causing wilful damage by sprinkling the dust, or of fabricating evidence with intent to defeat the ends of justice, he (Counsel) submitted that the evidence would be abundant to convict him on either of those charges. It was clear Adams was not a witness of truth; and the plaintiff's reliance upon him shook the whole of his case, because it rested on Adams's diary and the samples which he produced. It would be said that Mr. Ward had seen many of the things which had been spoken of by Adams. Of Mr. Ward everyone desired to speak with respect; but there was no doubt that he had dust on the brain. Mr. Ward had come, by three years of attention to this matter, to the conclusion that there was no ill of any sort in his factory which was not attributable to the processes carried on in the gas-works. It did not matter from what quarter the wind was blowing, according to Mr. Ward, the gas-works deposited dust on his premises. It was useless to point out to Mr. Ward that there were other factories in the vicinity, and that there was a railway close handy. Nothing would convince him that every inconvenience he might suffer did not proceed from the gas-works. Nobody had imputed, or would impute, anything to Mr. Ward, except that he had been too ready to believe Adams, and that he had been drawn, by the attention he had given to this case, to the conclusion that every speck of dust in that neighbourhood blew out of the Gas Company's premises. Mr. Ward rested upon Adams. Adams broke down by his own weakness; and Mr. Ward, so far as he relied on Adams, failed in that reliance, because of what Adams was proved to have done. Coming to the plaintiff's professional witnesses, first there was Mr. Stevenson, who was a gas engineer. He did not seem to have managed gas-works; or, if he had, it was a long time ago. But he was a consulting engineer to some gas-works at the Cape of Good Hope. This witness seemed to suggest that the defendants did not conduct their works when the Official Referee visited them as they did at other times, and that the Referee should have inspected the works at any time except when it happened to be possible for him to do so. Mr. Stevenson also said that the mechanical system of charging the retorts heightened the mischief while it was going on; and the defendants' retort-house was so close to Mr. Ward's premises that there was not time for the stuff to drop before it found its way into Mr. Ward's premises. The question of whether the old process of charging the retorts was better than the new, was not a scientific one, but a matter of common sense.

The Official Referee remarked that he thought the mechanical process was the better one as far so the plaintiff was concerned.

Mr. Duke said Mr. Stevenson had stated that it was not; and his evidence must be judged to some extent by that, because a man, whether he were an expert witness or not, who came into the witness-box and told them as a fact what one's own sense showed was not a fact, was not assisting the tribunal. The defendants had been so resolute in their determination to prevent nuisance to the plaintiff, that they had closed in their retort-house, except at points away from Mr. Ward's premises. Another suggestion of Mr. Stevenson was that the defendants drew their retorts before the charge was thoroughly spent, and that this caused an excess of dust. But this could be disproved by the records kept of the working. The Company's business was to make gas, and to do so as cheaply as they could. They aimed at getting the last atom of gas and tar out of the coal; and if the Manager was wasting gas, he must be doing it out of sheer mischief, and to the peril of his position. But if the Company's records were looked at, it would be found that the working was uniform. The coal was exhausted; and they got the result from every ton of coal in their works which they would expect to obtain. The learned Counsel then went at length through the diaries produced by the witnesses, and commented on the entries contained therein. On the days on which the diaries spoke of the nuisance to the plaintiff being the greatest, the pilot's books showed that the wind was blowing away from the plaintiff's premises; and therefore any nuisance which he suffered could not have been caused by the defendants' works. Those who had visited the spot were astonished to find that facing the gas-works, and with the full blast from the retort-house upon them, clothes could be hung out and dried a good colour. As negativing the theory of a continuing nuisance, it was pertinent to refer to the fact that when the Official Referee went over the plaintiff's works a large cobweb was discovered which was entirely free from dust or coal grit. Coming to the defendants' case, it was clear that, whatever nuisance had been suffered by the plaintiff, it certainly was not caused by the defendants. He then went on to describe the nature of the district in the neighbourhood of the plaintiff's premises, which were surrounded by other factories. There was the Corporation stone-yard opposite, where they had boilers, engines, and chimneys in full blast. There was a large joinery works, cement works, and briquette works, where they mixed up coal dust and made it into blocks. There were also various other works, each of which had a separate chimney. It had been admitted by the plaintiff, in his evidence, that even before the retort-house was built a great quantity of black dust came from the roads round about. A high screen had been put round the coke-shed, thereby preventing the escape of dust; and the retort-house, as Mr. Livesey said, had been boxed in as gas-works were not usually boxed in. As to the charge of soot coming from the chimney-shaft, the best answer to this was that they did not burn anything which would form soot. No doubt some of the samples of leather produced were much discoloured; but this in one had been attributed by the witness Whitmore to over-rolling. In conclusion, Counsel submitted that the plaintiff's case crumbled away by reason of the fraud that was knit in with it; and he asked the Official Referee to find, on the main issue, that there had been no actionable nuisance proceeding from defendants' works.

Mr. Graham, in reply, first referred to the undisputed fact that from the year 1877 down to the end of 1894 Mr. Ward carried on a successful business, and acquired a high reputation for the quality of the leather he tanned; and during all that time the railways and factories in the vicinity of his works were in existence. If the plaintiff's witnesses, who had made notes from time to time of what they had seen, were to be believed, it was quite clear that there had been a continuing nuisance. With regard to the adoption of the Dulier process, the only place where it would be of any use was in a confined area; but in the retort-house it would be absolutely useless.

Saturday, Aug. 7.

Mr. Graham, continuing his reply this morning, said one important point which could not be controverted was that the nuisance to Mr. Ward had continued. The fact that it came from the gas-works was, of course, disputed; and this was the issue which had to be tried. The nuisance had continued, either because the dust came from other factories or because Adams had scattered it about, was so conclusively proved by the evidence that he was entitled to point to it as an ascertained fact. The analysts agreed as to the presence of iron; and no one suggested that it could come from anywhere but from the coke and coal at the defendants' works. All the other factories, with one insignificant exception, existed for years before the retort-house was opened. The witnesses on the other side scarcely seriously contended that what was found could have come from those factories. The Manager of the Gas Company frankly admitted that he could not suggest that the mischief came from the chimney of the joinery, or any of the surrounding works.

Mr. Duke said this referred to the original nuisance in 1875.

Mr. Graham contended that what was going on now was the same as then. If the nuisance came from the other factories, the places between Mr. Ward's and those factories would be worse than Mr. Ward's. The evidence proved that by far the worst of the nuisance took place when the wind was in the south-east; and there was absolutely no other place where the smuts could come from except the gas-works. The evidence and probabilities were all one way that the nuisance was not caused by other factories or by the railway engines. The question was then reduced to this—that it was either caused by the operations of the gas-works or by Adams. In the first place, he should submit that it was physically impossible that Adams could have done what it was suggested he did, day by day and week by week, without having been detected. Mr. Newbigging and Mr. Tate had suggested that the mischief was caused by Mr. Ward's own chimney. But the first answer was that that chimney had existed ever since the year 1879, and that the same fuel—viz., coke and spent tan—had been burnt, and yet no trouble had been caused. In addition to this, in every tannery in the country, it had been the practice to burn spent tan without creating a nuisance. He complained very much of the way in which the charge of fraud on the part of Adams had been sprung upon the plaintiff. But what did the charge amount to? It was made against two men with respect to whom no shadow of suspicion had rested, and who had hitherto led respectable lives with unblemished characters. The charge was as grossly improbable as any that could be made. No one was more interested than these two men that Mr. Ward should continue to carry on his business. If Adams was peppering the place day by day with dust, he was doing his best to injure his employer. In the next place, was it likely that he would have done this in the presence of the lad M'Farlane, who, to say the least of it, was a troublesome boy, and had the reputation of being a young liar. It was physically impossible that any man could have covered the whole place with dust. If this was going on, it must have been going on constantly; and Adams's hands must have been like a chimney-sweeper's, so that he must have been detected by Mr. Ward or by some of the workmen. It was remarkable that, although Adams knew the witnesses were coming to look over the place, nothing abnormal was found by them when they made their inspection. Dealing with the evidence of M'Farlane, Counsel characterized the story told by him as highly improbable, and one on which no one would convict a dog. Against this story they had the direct oath of George and James Adams. It was no doubt a foolish thing that the dust collected by the painters should have been kept in the boxes in the loft. But they were put there by Mr. Ward's directions; and had not Mr. Ward mentioned their existence, the witnesses on the other side would not have known of them. If Adams was using the boxes for a fraudulent purpose, surely he would not have kept them in the loft.

The Official Referee: The odd thing is that James Adams says he never saw them until they were produced in Court.

Mr. Graham said James Adams did not work in that loft. If the plaintiff's case was right, no one ever attached the slightest importance to the boxes. The learned Counsel next dealt at some length with the evidence given by Jones, and characterized the story told by this witness as grossly improbable. No doubt if the Gas Company exercised great care in having their coal thoroughly carbonized, the plant could be so arranged that smoke and smuts would not be emitted; but, according to the evidence, this had not been done. The principal mischief was, no doubt, caused by the large body of steam produced by slaking the coke, which carried large quantities of small coal and dust into the air. If the evidence given by Adams was true, there was an end of the case. But omitting his evidence, there was still strong testimony to show that when the wind was in the south-east the mischief was as great as ever. In support of this contention, Counsel referred at some length to the evidence given by Mr. Ward, his son, and Mr. Stevenson (who had had a large experience of gas companies), Mr. Lane, Mr. Proctor, and other witnesses. The new process now in use for charging and drawing the retorts, though admirable from the Gas Company's point of view, as it saved time and money, was ten times worse for Mr. Ward than the old method, owing to the concentration and quick drawing. According to the analysis of the dust found on the plaintiff's premises, about 56 per cent. was coal and coke, which must have come from the defendants' works. The great strength of the plaintiff's case was that there was an enormous quantity of coke and coal dust brought in close proximity to his works, producing abnormal and extraordinary

results; and yet the Court was asked to say it was all nonsense, and that the mischief was caused by Adams. The defendants had not been able to call a single independent witness who could say that since they had started the Dulier process they had found no nuisance. It was not the business of the plaintiff to bring up the whole neighbourhood; but he had called four witnesses who spoke most distinctly to the fact that there was still a very considerable annoyance. Evidence had also been given by Mr. Ellis and Mr. Reed, who were experienced tanners, that it would be impossible for Mr. Ward to carry on his business unless the existing state of things was altered. He submitted with the utmost confidence, notwithstanding the prejudice which had been introduced into the case, that there had been no abatement of the nuisance, and that the plaintiff was entitled to compensation.

The Official Referee said, though he did not intend to give any elaborate exposition, he would at once express his view, and the reasons which had induced him to take that view. The case was one which had given him considerable anxiety. It had taken a long time to deal with—not longer than its importance to both parties necessitated; but a serious issue had been raised with regard to one, if not two persons who had been a considerable time in the employment of Mr. Ward. No doubt, in coming to a conclusion, it was necessary to consider the condition of things before the new works of the defendants were carried out. It was said, and with a great amount of truth, that before the new premises were erected all the sources of mischief which could have affected the plaintiff in any way were in existence. Then it was said that, this being so, one could not look to these as forming any portion of that of which plaintiff complained. It was also said—and apparently there was no doubt about it—that at one time after these works were put up a nuisance did unquestionably exist. It existed apparently, according to Mr. West's evidence, partly owing to the improper working by the defendant's men of the new process by which the coal that was being converted into gas was being treated, and also owing to the resulting coke being thrown against a wall adjoining the plaintiff's premises before the shed was made and covered over. Then came the reference before Mr. Ridley, and the compromise under which plaintiff received £3200. The question he had now to determine was whether or not the nuisance had existed since the last inquiry, or since the 24th of October, 1896, and whether the defendants had abated the nuisance wholly or partially since those dates. When the compromise was arranged, the defendants were given six months within which to abate the nuisance; and during this time they had closed in the coke-shed; they had closed in, as far as possible, the retort-house; and they had also introduced the Dulier process. Certain of the plaintiff's witnesses had admitted that since these things were done the nuisance had been distinctly less than it was two years ago. But this certainly was not the evidence of those persons who were in the employ of Mr. Ward, nor of Mr. Ward himself, nor of certain experts who saw what the state of things was before the premises were altered, and who had seen, so far as they could, what the condition of the premises was since the alterations. Then came the question: What were their means of judging? This brought one to consider the very disagreeable question of the conduct of Adams. No charge whatever was made against Mr. Ward. Adams had been in his employ for many years; and there was no reason why he should suppose that Adams would do anything dishonest. It was said, on behalf of the plaintiff, that the suggestion made by M'Farlane was grossly improbable. Undoubtedly it was so. The very gross improbability rather suggested to his mind the improbability also of such a story being invented. Though the story as told by M'Farlane struck him as being a very improbable one, he was more struck during the course of the cross-examination by the probability of the truth of it than he was during the time the lad was being examined in chief. He could not conceive, in spite of what Mr. Graham had said, that M'Farlane could have any real ground for inventing such a story. When it was suggested that the story was invented, one looked to see whether or not it was supported by the admitted facts of the case. M'Farlane stated that he saw Adams go up to the roof on several occasions and bring down stuff; and that Adams dried and then sifted it. It was admitted that on several occasions Adams did go up to the roof; that he did get stuff down; and that he dried and sifted it. There was some discrepancy in the evidence as to whether or not Adams put the stuff into a box; but undoubtedly he did do so. Adams at first said the box was given to him by the painters; but this was not true. M'Farlane's story was supported very much by what they now knew of what was actually done by Adams. He was not at all favourably impressed with the way in which Adams gave his evidence on this matter—in fact, he did not seem to be a witness of truth. M'Farlane's story was to some extent corroborated by Jones. The story as told by M'Farlane accounted for the whole of the other evidence; to the effect that, though the scientific men were surprised to find the state of things which they did find, they could not but come to the conclusion that the condition of the premises was not improved by the works which the defendants had carried out. They said they were surprised; and they must have been, because the alterations which had been made must have produced considerable reduction, if not complete abolition, of the mischief. The fact that the expert witnesses found no improvement was accounted for by the tannery not being kept in its normal condition, but being prepared for their view by Adams. He was justified in this conclusion by the fact that when Adams was not there the dust was nothing like of the same character as appeared by the joint report of Mr. Tate and Dr. Hellon. There were other facts which also led to the conclusion that M'Farlane's story was true. For instance, according to Adams, whichever way the wind blew, dirt came in. At one stage of the case, Mr. Ward admitted that, unless the wind blew in a southerly direction, nothing to damage him could come from the defendants' premises. But according to the entries in Adams's diary, the blacks were just as bad when the wind was blowing from the north, north-west or north-east. It was suggested that the whole place was so saturated with blacks coming from the defendants' works that, whichever way the wind blew, blacks would enter the plaintiff's premises; but he did not believe this theory. The experiments referred to by Mr. Stevenson, of holding a white plate in the smoke from the chimney, which had been very fairly conducted, went to show that blacks and smuts did not come in any real quantity from the defendants' works. As Mr. Bellamy very properly said, it did not necessarily follow, because one saw smoke, that one must have a large quantity of smuts. This was said, not with reference to the defendants' chimney, but to some of the other chimneys the smoke from which would reach the tannery. He had come to the conclusion that the nuisance or damage to the leather of which plaintiff complained had not been caused by the defendants' works since the period when the alterations were made. Then arose the question whether there had been any substantial nuisance between April and October. He thought that, since the alterations were made in September, there had been no nuisance. Consequently, since the 24th of October, the nuisance had not existed. There was no greater nuisance from April till October than there was after October; and any nuisance there might have been between those months was due just as much to other circumstances as to any dust or dirt from the defendants' works. He had not arrived at this conclusion without considering the matter very seriously, and after giving due weight to the whole of the materials which had been placed before him. In his opinion, as the nuisance had ceased to exist, his report must be in favour of the defendants.

Mr. Graham pointed out that evidence had not been given on the question of damage between April and October; and he suggested that nothing further should be done until after the Long Vacation, so that the plaintiff might consider whether it was worth while to go on with this part of the reference.

Mr. Duke could not see the relevancy of this evidence, in the face of the finding that there was no nuisance between April and October.

After some discussion, it was arranged that the Official Referee should issue his report upon the questions decided, but that the question of damages should remain open.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Friday, Aug. 6.

(*Before Baron* Pollock *and a Special Jury.*)

Wickens v. West Ham Gas Company.

This was an action to recover damages for breach of contract to supply gas. The plaintiff, who carries on business as a dairyman at 6, Plashet Lane, Upton Park, alleged that, having complied with all the provisions of the Act of Parliament, he was entitled to a supply of gas, and that the defendants, on Dec. 9, 1896, without just cause or excuse, wilfully and wrongfully cut off and discontinued the supply to his premises. The gas was cut off at 5.30 in the evening; and the plaintiff was deprived of light for upwards of two hours—being seriously inconvenienced in his business thereby. He alleged that no notice of the intention to cut off the gas was given to him by the defendants; and, further, that there were no arrears due or owing from him for gas or meter-rent on any account whatever. Plaintiff, in his evidence, stated that his business had greatly suffered owing to the act of the defendants. He was cross-examined at some length with the view of showing that he was continually in default with his payment for gas; but witness stated that he always paid when he received the final notice. Upon being shown a receipt, he admitted that it was for two quarters' gas.

Mr. Wallace, Q.C., and Mr. Sims appeared for the plaintiff; Mr. Lawson Walton, Q.C., and Mr. Hutchinson for the defendants.

His Lordship asked whether the parties could not arrange the matter, and so relieve the jury from deciding it.

After a short conference, it was stated that the parties had come to terms, and that judgment would be entered in accordance therewith.

LIVERPOOL SUMMER ASSIZES.—Tuesday, Aug. 3.

(*Before Mr. Justice* Kennedy.)

Tyldesley-with-Shakerley District Council v. Atherton District Council—A Disputed Water Supply.

This was an action for money due under an agreement for the supply of water.

Mr. M'Call, Q.C., and Mr. Horridge appeared for the plaintiffs; Mr. Pickford, Q.C., and Mr. Sutton for the defendants.

Mr. M'Call explained that the action was brought by the plaintiffs to recover the balance due on quarterly instalments of a water-rent. The points to be decided were whether, under the agreement, defendants were entitled to make any deductions, and whether they were entitled to recover damages for alleged breach of the contract set out in the claim. In October, 1867, the Tyldesley Council obtained from Manchester a water supply; the agreement being that Manchester was to deliver to Tyldesley in bulk a quantity of water of a certain quality. In 1868, the Atherton Council obtained from plaintiffs a portion of the supply received by them from Manchester. The agreement entered into between the plaintiffs and defendants was to the effect that the former should deliver to the latter "a continuous supply of water in bulk of the same quality as that distributed at Manchester." In the agreement there was no mention of pressure; and plaintiffs contended that they had fulfilled their contract. It was true defendants found at one time that the water did not reach the highest portion of their district; but no deductions were made on that account—providing plaintiffs were carrying out their agreement. In order to serve the highest part of the district, defendants, in 1890, obtained a further supply from Bolton; but no claim was made on the plaintiffs for expenses. In 1893 and 1894, however, complaints were made by defendants as to the pressure.

Mr. Pickford: Complaints were made several times before that date.

Mr. M'Call (proceeding) contended that the plaintiffs had from first to last supplied the contract quantity of water, though it was not always taken in full by defendants, as, owing to the Bolton water being supplied at a higher pressure, the plaintiffs could not send theirs into the system.

Mr. Pickford said that undoubtedly if the plaintiffs had supplied the right quantity of water, the defendants would have to pay for it; but if plaintiffs were not in a position to supply the true quantity, then the deductions were proper. Plaintiffs were bound to supply a continuous quantity of water in bulk; and if they could not do this without a certain

pressure, they must maintain that pressure. That was what the agreement meant, apart from the word "quality." The plaintiffs did not get over their responsibility by saying that the quantity was in the pipes, and the defendants could take it. That was not delivering a continuous supply. Then as regarded the words "the same quality as that distributed in Manchester," the word "quality" not only applied to the kind of water, but to the quality of the water supply. The reason defendants had to get a further supply from Bolton was because they were not receiving it from plaintiffs.

Witnesses having been heard, judgment was reserved until the following morning, when

His Lordship said the claim was for the balance of water charges; and defendants counterclaimed for damages with regard to the performance of the agreement in question. Some reference had been made to the meaning of the word "quality" in this case; and he thought it would be forcing the use of the word to make it apply to the water supply as distinct from the kind of water. Plaintiffs had put the water in the place decided upon, and they seemed fairly to contend that, if defendants wanted to use that water in places where a high pressure was necessary, they must erect pumping-stations, &c. Plaintiffs did not enter into any contract with regard to pressure. All they undertook was to have ready a supply of water continuously for defendants to take in what manner they desired. Under the circumstances, judgment must be given for plaintiffs for the amount claimed, and also on the counterclaim.

On the application of Mr. Pickford, a stay of execution was granted.

The Incandescent Gas-Light Company's Patents.

In the Queen's Bench Division of the High Court of Justice last Friday, Justices Lawrance and Collins had before them the case of *The Incandescent Gas-Light Company, Limited, v. The Figaro Incandescent Fittings Company and Another*. It was an action for infringement of the plaintiff Company's patents, and came on as a motion for judgment in default of defence; Mr. Walter appearing for plaintiffs. The usual order was made for an injunction, an inquiry as to damages, delivery up of infringing articles, and costs. On the following day, Mr. Justice Romer, in the Chancery Division, made a similar order against the Unrivalled Incandescent Lighting Company.

Tipton Gas-Works.—Last Thursday Colonel C. H. Luard conducted an inquiry at Tipton in respect of an application by the District Council for sanction to borrow £2000 on the gas-works account. It was explained by Mr. Vincent Hughes, the Gas Engineer, that £300 was required for the purchase of penny-in-the-slot meters, for which there was a large demand; £700 for ordinary meters; and £1000 to repay money spent out of revenue.

The Salford Corporation and the Automatic Gas-Retort Company.—At the meeting of the Salford Borough Council last Wednesday, Mr. Yearnshaw, referring to the item in the minutes of the Gas Committee to the effect that the Automatic Gas-Retort Company had agreed to compromise their claim against the Corporation for royalty in respect of inclined retorts for a payment of £1000, asked what this amount included. He was informed by Mr. Phillips that it was to cover the claims in respect of the past, the present, and all future installations of inclined retorts at the gas-works, with the addition of the taxed costs. Mr. Yearnshaw then asked what was the whole cost; and he was told that this information would be given when the bill came in.

Newcastle-under-Lyme Gas Accounts.—At the last meeting of the Newcastle-under-Lyme Town Council, Alderman Briggs made his annual statement as Chairman of the Gas Committee. He said the profit on the revenue account was £6059, which exceeded any account hitherto placed on record. They had to deal with the larger amount of capital which they now required. When the Council bought the works they were in a very dilapidated condition; and as the output had increased from 50 to 90 million cubic feet, it was absolutely necessary the plant should be extended. The works were in the unfortunate position that they could not be suitably patched up; and the Committee had therefore to spend £14,000 on re-construction. A few years ago the supply in the borough was defective; and in order to save expenditure by the Urban Sanitary Authority, certain concessions were made, which represented between £500 and £600 a year. If it had not been for these concessions, they would have been able to show an additional profit this year of about £600. Since the gas-works had been bought, the Committee had handed over £18,800 in relief of the rates, had spent £10,300 in the redemption of capital, and £13,250 on the works, mains, and plant; and added to the sum of £6000 given to the local authority on the reduced scale of charges for public lighting, the borough had benefited to the extent of £48,350 since the works came into the hands of the Corporation.

South Hants Water Company.—By the report of the Directors of this Company, it appears that the rent-roll has increased by £544 during the past half year, and that 365 additional houses have been supplied with water. The profit and loss account shows an approximate available balance of £2337 for the half year, after writing off the entire cost of opposing the Southampton Corporation's Bill in Parliament. The Directors propose to pay an interim dividend for the past six months, at the rate of 5 per cent. per annum on the ordinary shares, and at the rate of 3½ per cent. per annum on the new ordinary shares. The Directors congratulate the shareholders upon the success of the opposition offered by the Company to the above-named Bill. With reference to the works, the report states that a duplicate 18-inch main has been laid from the Mitchelmersh Works to Romsey. An additional reservoir is being constructed on the high level at Mitchelmersh; and it is proposed to build another at Basset. An extra boiler and engine power is being provided; and the house to contain the same is to be erected forthwith. A 10-inch main from Chandler's Ford to Compton, Shawford, and Twyford, has been laid for a considerable distance. To meet the heavy outlay consequent upon the carrying out of the foregoing and other works that may be found necessary, the Directors propose to ask the proprietors to authorize the raising of additional capital to the extent of £25,000, and also £10,000 debenture stock, bearing interest at 4 per cent., to be issued upon such terms as the Directors may deem desirable in the interest of the Company. The Directors also express regret at the death of their old and esteemed Auditor, Mr. W. Edmonds.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Chief Office, Horseferry Road, Westminster, last Friday—Colonel W. T. Makins (the Governor) in the chair.

The Secretary and General Manager (Mr. J. W. Field) read the notice convening the meeting; and the report of the Directors, with the accounts for the six months ending June 30, given in the "Journal" last week, was taken as read.

The Governor, in moving the adoption of the report, referred with deep regret to the loss the Company had sustained by the recent death of Mr. John Orwell Phillips. He said Mr. Phillips's work for the Company extended over 32 years; and since 1894 he had been a Director. It would be impossible to exaggerate the value of the services rendered to them by Mr. Phillips. But for the way in which the deceased gentleman initiated and, with the help of his Court, carried out his policy of the various amalgamations, the position of the Company would have been very different from what it was. He believed that the only great disappointment which Mr. Phillips had ever experienced was when the arrangement which had been almost completed for the amalgamation of the Company with the South Metropolitan Gas Company fell through, for some reason which he (Colonel Makins) had never fully understood. This was a great disappointment to Mr. Phillips; and, looking back, he (the speaker) felt that it would have been a very good thing for the proprietors of both Companies. However, this was a matter which could not now be altered. He believed the greatest satisfaction was felt by Mr. Phillips on the day when he took his seat as a member of that Court, which he had served so long and faithfully. He (Colonel Makins) was glad to be able to say that, though when Mr. Phillips retired from office they lost a most valuable officer, the interests of the Company had not suffered, for they had in Mr. Field a man animated by the same devotion to the welfare of the undertaking, and possessing abilities of a high-class order; and he assured the proprietors that the interests of the Company were promoted in every possible way by their able General Manager. There was only one other personal question to refer to, and then he would deal with the usual matters which came before them at their meetings. They had had to seek for a fitting person to take the place of Mr. Phillips on the Court of the Company; and he considered they had been singularly fortunate in securing the co-operation of Mr. Corbet Woodall. He thought it would have been very difficult to find any other gentleman who combined so many qualifications for the post, and whose election as a Director would be more likely to be of benefit to the Company at large. Turning to the report for the half year, he said it had caused the Directors the greatest satisfaction, which he had no doubt would be shared by the proprietors, to find that the sale of gas, which was their principal source of revenue, had increased at a rate considerably greater than in any June half year since 1891, and this notwithstanding the fact that in the period just ended there was neither prolonged frost nor fog, and that the recorded hours of sunshine had been quite of a Diamond Jubilee order. An increase of 7 per cent., or 690,692,000 cubic feet, in the consumption, yielding an addition to the Company's rental for the half year of £96,066, he thought they would agree was a most encouraging record. The figures were good all round. The sale of gas per ton of coal and enrichment was nearly the highest in the annals of the Company. They sold in the past half year 9715 cubic feet of gas per ton; and the figures of the increase under the several classes of consumers would be interesting to the meeting. In 1897, they sold to ordinary consumers 9,508,190,000 cubic feet, as compared, in the June half of 1896, with 9,011,864,000 cubic feet, or an increase at the rate of 5·5 per cent. With regard to automatic meter consumers, in the June half of 1896 they sold them 320,042,000 cubic feet, as compared with 507,999,000 cubic feet in the past half year; the rate of increase amounting to 59 per cent. The growth of that class of their business was therefore really remarkable. With respect to the public lights, they sold last half year 527,197,000 cubic feet, against 520,788,000 cubic feet; the rate of increase being 1·2 per cent. These three increases made the 7 per cent. increase which they had had on the whole of their consumption. They had also had an increase in the stove-rental, though only to the extent of £1800; and there had been an increase of 13,200 in the number of stoves fixed in the half year. These were very satisfactory indications of what was going on in the way of increase in the use of gas for heating and cooking purposes. He had had another return made which he thought proved abundantly that a very large proportion of the increase in their business had been brought about by the continually extending use of gas during the day. He had taken three specimen years. In 1886, the day consumption compared with the consumption for the whole 24 hours represented only 30·6 per cent.; in 1891, it represented 32·6 per cent.; and in 1896, 38·5 per cent. Comparing 1896 and 1886, there was an increase in the proportion of 26 per cent. Those who were familiar with gas matters would know how valuable it was to get the use of the mains and plant in the daytime, in order to reduce the load factor, and make their capital more productive. Before he left this subject, he would give the numbers of the consumers on June 30, 1895, 1896, and 1897. In 1895, they had 217,674 ordinary and 10,325 automatic consumers, making a total of 227,999; in 1896, the total number was 264,246, made up of 221,913 ordinary and 42,333 automatic consumers; and on June 30, 1897, the total number was 293,616, of which 228,492 were ordinary and 65,124 were automatic consumers. With respect to the capital expended in the half year, it amounted in all, allowing for a credit of £8240 from the sale of surplus land, to £122,092. Of this amount, £27,000 had been laid out at Beckton on hydraulic machinery (£7000), the extension of the jetty (£5500), and on the railway and viaduct and waggons (£14,500). At the chemical works they had spent a sum of £5000 on naphthalene, purification, and liquid ammonia plant, &c.; £4148 on sundry buildings and machinery, £28,122 on pipe laying work, £40,140 on meters, and £25,923 on stoves. The amount of capital per 1000 cubic feet of gas sold had been reduced from 12s. 8d. in June, 1896, to 12s. 3d. in June this year; and the charge for capital per 1000 cubic feet had been reduced from 13·54d. to 12·83d., or a reduction of nearly ¾d. within twelve months.

This he thought they might regard as very satisfactory. Like all other gas undertakings—whether in the hands of local authorities or public companies—they had again to record a very low return for residuals. Coke had yielded less than in June, 1896, by nearly 6d. per ton. But during the past two or three months there had been a better demand for it at higher prices; and in view of the improvement in trade generally, and of the cement trade in particular, they looked forward to securing materially better prices for home consumption when the time for making the contracts for next season came round. But there was one point in connection with coke to which he would again refer; it was the influence upon its manufacture which the extending adoption of the water-gas system had already had. If the proprietors would refer to the accounts, they would see that the quantity of coke made for sale—made, less used - was 497,000 tons. The corresponding figures for 1896 were 500,500 tons; so that while the sale of gas had increased at the rate of 7 per cent., the make of coke available for sale had decreased to the extent of 3500 tons. This was not the whole advantage. The exact quantity of coke taken off the market during the past half year in consequence of the oil-gas manufacture had been 68,800 tons, against 27,700 tons in the June half of 1896; and he might add that the Directors were so well satisfied, on the above and other grounds, with this system of enrichment, that they had now in course of construction additional installations of oil-gas plant—one at Bromley and the other at Nine Elms—two stations where there was always more or less difficulty in disposing of their coke. He thought it was also very reassuring to gas makers to see that this policy had been extended all over the country; so that if the present low price of coke was the effect of over-production, the remedy appeared to be now in course of application. It had been said on more than one occasion that gas companies should not send their coke out of their districts into the districts of their neighbours; and those who did not so confine their sales were called the "curse of the trade." Such remarks were foolish in the extreme. Of course, they would all be very glad if no provincial coke came into London, as this would enable the Metropolitan Companies to get a much better price for theirs; but such a policy as that applied to Beckton would be madness. They had no local trade there. The local trade for coke at Beckton was only equal to that of a considerable sized village. They must therefore have an outlet. It was useless to complain that they sold their coke out of their district. The condition of the various Companies differed considerably. There could be no hard-and-fast rule; and they must be left, subject to the control of their shareholders, to deal with their affairs in the way they found most to the advantage of their respective Companies. The stock of coke in hand, he was glad to say, showed a material reduction as compared with June, 1896. The reduction would have been larger had they been in a position in the last shipping season to afford better facilities for loading at Beckton. They had lately been engaged in improving and dredging their berths; and they were now able to load large vessels at once, and send them away. If their contractors removed by the end of September the quantities due to them up to that date, the stock on hand would then be only a normal one. Had the price of coke and of residuals generally been the same in the past half year as in the corresponding period of the previous year, they would have been level with respect to their dividend, and it would not have been necessary to dip into their reserve fund or accumulated balances. Tar products had been seriously disappointing. Pitch and anthracene had both fallen considerably in price; but for both articles they had favourable contracts running. On the other hand, creosote and other oils, which were very important items in the account, had advanced, and were likely, it was generally believed, to go higher. In their Company they had not felt the full effect of the recent fall in the market prices of residuals; and their general results for the past half year on this head would compare favourably with those of any other gas undertaking, he thought, in the Metropolis or the neighbourhood—in fact, in England generally. Sulphate of ammonia had been selling in the half year at lower prices than ever; and though the price now showed a slight improvement, it was still exceedingly low, but quite high enough to allow of sulphate being profitably manufactured, not only by gas companies, but in gas-producer plants, in coke-ovens, and at shale-oil works. There was some consolation, however, to be found in the consideration that low prices had at last induced the manure makers and agriculturists to use sulphate of ammonia in place of nitrate of soda; and their shipments during the past twelve months had shown that, at present prices, the demand for sulphate was a rapidly growing one. He would read some figures in support of this, which were given at a recent meeting of representatives of the nitrate industry. Since the decline in the price of sulphate of ammonia, which set in in 1894, the consumption had increased from 218,000 tons to 365,000 tons per annum, whereas the increase in the consumption of nitrate had been from 20,245,000 quintals to 24,603,000 quintals only; and it was further alleged that during the past three months of this year the consumption had decreased to the extent of 1,500,000 quintals, though the price had declined by 9d. per quintal. He did not give these figures as their own; but he had no reason to doubt their substantial accuracy. He might mention, with respect to the question of sulphate, that a conference had recently been held among the manufacturers, and an Association had been formed for the purpose, by advertising and other means, of bringing the real value of sulphate thoroughly before the minds of agriculturists and others who might be expected to use it. They were, he was bound to say, taking a leaf out of the book of their opponents, because the Chilian Government had devoted some £25,000 to exactly the same object, with the view of pushing the sale of nitrate, which they saw had so seriously fallen off. That Association made a small levy of 6d. a ton on the make of sulphate from each manufacturer represented, and this would produce a few thousands, which he thought would be well spent in bringing the claims of sulphate well before the public. The Company were represented at that conference by their salesman, Mr. Blagden; and he (the speaker) had every hope that it would lead to good results. As to the future of this market, no one would risk an opinion. It might be that those who were now using sulphate of ammonia for the first time would ascertain for themselves the greater value of this material for manurial purposes than its rival, nitrate of soda, and would be willing to pay a proportionately higher price for it in the near future. For the last five years, prices of residuals had shown a reduction in revenue in the case of the Company of 10¼ per cent.; in that of the other Metropolitan Companies, of 13¾ per cent.; in that of the Suburban Companies, of 10¼ per cent.; and in the case of representative Provincial Companies and Corporations the reduction had been 12½ and 16¾ per cent. respectively. On the whole, therefore, they were doing quite as well as, and perhaps a little better than, their neighbours. On expenditure he would not have to detain them very long. The principal item—that of coal—was again exceedingly satisfactory. The cost per 1000 cubic feet of gas had been 13·6d., against 14d. in the June half of 1896. They might not be able to maintain this very low figure, but he did not suppose that it would be very materially exceeded; for although they would have to pay a few pence more per ton for their coal under their new contracts (which might, to some extent, be accounted for by recent legislation), yet, on the other hand, their purchases of oil for enrichment had been made on such favourable terms that the saving effected under them would go a long way towards meeting the increased cost of coal. The addition to their coal bill would be about £40,000 a year; and the reduction in their oil bill would, he thought, be upwards of £25,000 a year. To this extent, therefore, they would be able to meet the increased cost of coal. Then the cheaper oil enabled them with economy to reduce the consumption of coal; and in the interests of the gas consumers, he sincerely hoped that the oil market would not take a leaf out of other markets and combine together, because these combinations rendered business, if not impracticable, full of difficulty, and would retard the progress of the use of oil as an enriching material. Their wages showed a small reduction in the cost per 1000 cubic feet; and he was happy to say that labour was not a burning question with them. Nevertheless, with the view of the substitution of economical working by machinery, whenever they could they replaced manual labour by machines; and a very large saving had been already effected by adopting this policy. Wear and tear was slightly higher; but even in these times they could not afford to allow their works and plant to go down or fall below the standard of repair and maintenance which they regarded as safe. He believed, from a personal inspection, that their plant was never in better condition than it was now. Their distribution charges in the aggregate were within £200 of last year's figures, and called for no special comment, beyond a repetition of what he had stated on more than one recent occasion—that the increased charges under this head were to be attributed only to the additional and special work in connection with automatic meter supplies. Rates—this was a burning question—showed an increase of £2788; and so long as every facility, if not every inducement, was offered to local authorities to raise loans and to spend the money so borrowed on all kinds of fads and fancies, so long would the ratepayers have to find the money and the consumers of gas bear their proportion of it. During the past half year, some very valuable evidence had been given before the Commission on Rating by the Chairman of the South Metropolitan Gas Company, the Manager of the Commercial Gas Company, and other gentlemen, who had pointed out in the clearest possible way the iniquitous system on which gas companies were rated; and they had also offered two or three suggestions for a different plan. The Court of Directors considered the matter; but their feeling on the whole was that they could hardly go before the Commission with a grumble only, without offering some practical suggestion for a remedy of the evil complained of. They might have made a suggestion, but it would not have been applicable to anyone but themselves; and in order to deal with this question, he thought it was necessary that some scheme should be put forward which would meet with the support of a very large majority of industrial undertakings. He did not think there was the slightest chance of their getting any special legislation for gas companies. It was true that their industry was, perhaps, more throttled than any other; and he believed they paid on a higher rate scale. Mr. Livesey, who he was glad to see was present, would give them some information upon this question. He believed they paid on a higher scale than the electric lighting companies; but it was just open to question whether the retort might not be urged that the gas companies had a monopoly, whereas the electric lighting companies had only a lease for 42 years. There were several points that would be taken into consideration by the Rating Commission; and they must await their report before they could go further into the subject. There had been a small addition in the items of salaries, collectors' commission, law, and bad debts; but these were simply the results of extended business. The increase of £644 in the item of annuities was the cost of the extended application of the Company's old-age pension scheme. This scheme apparently cost them £4000 a year. But he very much doubted if the actual cost of the adoption of this policy was anything like that sum, because, under the old *régime*, it was a difficult and very unpleasant task for their Engineers to dismiss an old employee simply on the ground of his age. Now he was pensioned, and his place, if it had to be filled up, was taken by a younger and more efficient hand at a lower wage. On the whole, therefore, he thought that the system was distinctly humanitarian; and he believed that the shareholders of the Company lost nothing, or very little indeed, in having adopted it. This half year, in view of the necessity for withdrawing something from their reserve fund, they had treated the interest on that fund as revenue. In better times, they had carried it to swell the fund. The net result of these *pros* and *cons* was that, although they had to provide dividend upon an increased capital to the amount of £10,095 for the past half year, they were able to pay the statutory dividend by withdrawing from their accumulated funds £55,103 (the undivided balance of £45,748 and £9355 from the reserve fund), as against £55,224 in June, 1896. On the whole, and under all the circumstances he had explained, he did not think this was unsatisfactory. It was true their reserve fund would be reduced to £123,000—or perhaps something more, because it was invested in Consols, and they took them at par. With regard to the future, while their first endeavour would be to postpone as long as they possibly could any increase in the price of gas, because such a course might have the effect of checking their sales, the proprietors might rely upon it that if they saw their dividend in danger at all they would not hesitate at once to increase the price. Their feeling was that they could not justify the raising of the price of gas at the present time, the effect of which would be merely to swell the reserve fund. Personally, he could not himself see what was the use of a reserve fund which was never "tapped"—always being increased; nor could he see the use of a sliding-scale which only moved in one direction. He thought the proprietors might feel a tolerable degree of comfort, because, though he would not attempt to prophesy, he thought

it was very likely they would be able to steer their ship through a difficult channel without having to throw overboard any part of her dividend cargo. This brought him to the sale of stock by auction on the following Monday. Hitherto, they had always offered the stock by tender to the shareholders, except on the first occasion. This, however, was a very cumbrous process; and this time, the amount of stock to be offered being only comparatively small—£25,000—they thought it a good opportunity of making a sale by auction; and they had put the stock in the hands of Mr. A. Richards, who had been very successful in the past few years in obtaining good prices for gas stocks at his auction sales. They would be able next October to revert to their borrowing powers. For the past ten or twelve years they had been very much hampered, under the provisions of their London Amalgamation Scheme, by not being able to have recourse to their borrowing powers. From this time, however, they would be able to raise loan capital step by step with their ordinary stock, and thus reduce their charge for capital. He was now in a position to give the proprietors an outline of the Bill which they hoped to submit to Parliament next session for dealing with the capital and debenture stocks of the Company. They must look upon this as a somewhat informal statement, but he thought they might accept it as representing what the provisions of the Bill would be when finally revised. As regarded the existing preference stocks, the proposal was to convert them into such amounts of a new 4 per cent. consolidated preference stock as would yield the same amounts of dividend as were at present paid at varying rates on the existing stocks—namely, each £100 of the existing fixed 5 per cent. preference stocks to be converted into £125 of the new 4 per cent. stock; each £100 of the existing 10 per cent. stocks, into £250 of 4 per cent. stock; each £100 of the existing 7½ per cent. stock, into £187 10s. of 4 per cent. stock; and each £100 of the existing 6 per cent. stock, into £150 of 4 per cent. stock. As regarded the comparatively small amount of £100,000, the existing "B" 4 per cent. maximum stock, which it would be difficult to deal with on the same lines as the "H" 7 per cent. maximum stock, it was proposed to convert it into an equivalent amount of the new 4 per cent. preference stock. With respect to the very small amount of £820 remaining unconverted of the convertible 5 per cent. preference stock, it was proposed to continue it as 5 per cent. preference stock; retaining its option of conversion into ordinary stock in such a manner as to preserve to the holders their existing rights as to dividend. He might, however, take the opportunity of explaining to the holders of such convertible 5 per cent. perference stock how very desirable it was, in their own interests, or in the interests of those whom they might represent as trustees, that they should at once exercise their option of conversion. Apart from the fact that if the stock were converted into ordinary stock their holdings would, under present circumstances, yield over two-and-a-half times the amount of their present income, they could, if they objected to hold, or were precluded from holding, ordinary stock, by the exercise of such option and the subsequent sale of the stock as converted, obtain on such sale a sum which, even if invested in Consols, would yield a return of income about half as much again as they at present received. The holders of this £820 must be very rich people, or else they never took the slightest trouble to consider what their investments were. He hoped, however, that his words might reach them; and this might result in the conversion of their stock. With regard to the present "H" 7 per cent. maximum stock, it was proposed to convert it into twice the amount of a new stock having a maximum rate of dividend of 3½ per cent. per annum instead of the existing 7 per cent.; and in the very improbable event of the dividend on the new ordinary stock, which he would presently describe, ever falling to a rate proportionate to the rate of 7 per cent. per annum on the existing ordinary "A" stock, the dividend on the new 3½ per cent. maximum stock would fall proportionately to that on the ordinary stock; so that, under any possible conditions, the dividend on each £100 of the new 3½ per cent. stock would be exactly half as much as that on each £100 of the existing "H" stock if it remained unconverted. With reference to the debenture stocks, it was proposed to convert them into a new 3 per cent. consolidated debenture stock on a precisely similar plan to that which he had described as applicable to the preference stocks. As regarded the existing ordinary "A" stock, having a standard rate of dividend of 10 per cent. per annum, subject to rise and fall in proportion to the price of gas, it was proposed to convert every £100 of it into £250 of a new ordinary stock having a standard rate of 4 per cent., which would give the same rate of interest that was now paid on the £100 of existing stock. He might state that, with regard to the ordinary stock, they had followed exactly the lines of the South Metropolitan and other Bills which had received the assent of Parliament. The existing sliding-scale was modified so as to make the dividend rise and fall with the price of gas. It was proposed to insert a clause in the Act empowering trustees, unless by their own deed of appointment expressly forbidden to do so, to invest trust funds in the Company's 3 per cent. consolidated debenture stock and 4 per cent. consolidated preference stock. This finished the finance of the half year. He was sorry, before sitting down, to find himself compelled to refer to a statement made by Dr. Collins, the Chairman of the London County Council, in his annual presidential address to the Council on the 20th ult. The extract which he desired to read was as follows: "In the matter of gas testing, the old candle standard has been found unsatisfactory, and a Board of Trade Committee reported two years ago that the 10-candle pentane argand should be substituted for it. The Law Officers of the Crown advised that the Gas Referees could prescribe the new standard without legislation. Subsequent information indicated that the Referees deemed it necessary to introduce a Bill; but no progress appears as yet to have been made, either by prescription or by legislation, and the daily gas testings are going on with the old variable and unreliable standard, to the disadvantage of the consumers. Tests made with the portable photometer, although unrecognized by law, continued to show that a large amount of the gas supplied at other than the testing-stations"—this was rather vague; he did not know what it meant, because there were no other testing-stations than those where the gas was supplied—" is considerably below the statutory requirement of 16 candles. The Chemist concludes from the investigations he has made that 'the effect of the present system of enrichment is partial, and confined to the proximity of the testing-places.'" As regarded Dr. Collins's description of the candle as a standard of light, he (Colonel Makins) agreed with him. In fact, it was a mere truism to say that the candle had been tested and found deficient in those properties required in a standard. But he went farther than Dr. Collins, and he did not hesitate to say that had the Gas Companies had a reliable standard of light—one to which they could have worked more closely—the consumer of gas would have benefited to a very material extent in the matter of price during the past twenty years, because large sums of money which should have been available for reduction in price had during that period been needlessly devoted to the maintenance of an excess of illuminating power not only above the parliamentary standard, but also above the requirements of the consumers. It was for these reasons that they had been not only willing, but anxious, to forward the adoption of the pentane standard of light. But when Dr. Collins attempted to fasten upon the Gas Companies a charge of supplying gas of a quality below the parliamentary standard, because a travelling photometer—an instrument which had no parliamentary sanction of any kind or degree—recorded some low tests, taken under circumstances and conditions wholly unrecognized, not only by Parliament, but also by the Referees who were appointed by the Board of Trade to determine, within certain limits, how and where tests of gas were to be made, he was embarking upon a wide sea of speculation. Dr. Collins was not content with making charges and insinuations which were most offensive; but if he (the speaker) read aright the words of the Chairman of the London County Council, the latter wished to convey the impression that the Gas Companies were wilfully conducting their manufacture in a distinctly dishonest way—that by their system of "partial" enrichment, gas which was known to be going to the proximity of a testing-station was enriched up to the regulation standard, and the other streams of gas intended for districts distant from such testing-station were allowed to go out without such enrichment. Perhaps something might be excused to the Chairman of the London County Council for his ignorance of the very rudiments of the gas trade; but he had no right to impute fraudulent trading tricks to gentlemen of character in no way inferior to his own. After all, perhaps, the whole of Dr. Collins's references to enrichment were rather a matter for ridicule than for censure, because of the utter absurdity of the suggestion which he endorsed. How was it possible that a stream of poor gas should, as it turned the corner of a street where there was a testing-place, suddenly become enriched; and then, having passed the testing-station, at once part with its illuminating properties, or hold them in suspension until (four or five miles after) it again realized the fact that it would have to be tested, and could then once more develop a high illuminating power. A good deal of what he had stated was made up of figures, as had been pointed out by his mentor and never-failing critic—the "Journal of Gas Lighting," which went so far as to accuse him of not understanding his own figures. Upon the latter point he must be permitted to have his own opinion. The habit of producing figures, however, in support of statements was not his, but was followed by railway chairmen and by the Chancellor of the Exchequer in introducing the Budget. Why should those present accept his *ipse dixit* without the support of figures? It was no light task to compile these figures; and it was done solely to show them the true and real position of the Company, and not for the purpose of making out that he was first cousin to a Senior Wrangler.

The Deputy Governor (Mr. H. C. Ward) seconded the motion.

The Governor invited discussion, and said he might perhaps ask Mr. Livesey to give them a little light on the rating question from his point of view.

Mr. George Livesey said he saw that the Company paid, in round figures, about £222,000 a year in rates—that was about one-fifth of the total divisible profit. He contended that gas was most unfairly rated, and that there were very few articles more necessary than this. When they cut out the primary article of food from a community like London, there was no greater necessity than cheap light and cheap fuel. Gas was taxed to its present extent in aid of the rates to the disadvantage of the consumers. The £222,000 a year paid by this Company in rates was taken out of the consumers' pockets to the extent of five-sixths or six-sevenths; and it amounted to 2½d. per 1000 cubic feet. They were charging 2½d. per 1000 cubic feet more than would be necessary if there were no rates at all. Of course, there must be rates; but if they were charging 2½d. per 1000 cubic feet less for the gas they supplied, they would be able to divide about £35,000 or £40,000 among the shareholders, and the consumers would be saved £222,000. His contention was that gas was rated more heavily than any other commodity in use. The amount at which one of the largest breweries in London was assessed came before him the other day quite incidentally. He found they were assessed at £18,000; and they paid about £6000 a year in rates. He was told that this same brewery had been assessed for income-tax on £300,000. Their rates were thus one-fiftieth part of their profits; but the rates of The Gaslight and Coke Company were one-fifth part of their profits. Gas was unfairly rated compared with all other things. Whereas gas companies were rated on their profits, other businesses were rated on their rent value. He would take the case of a man who paid £100 for his business premises. He made a profit of £500, and was rated on the £100 or less. Taking the rates at about 6s. 8d. in the pound, he would pay £33 in rates out of a profit of £500; but if it were the case of a gas company, they would pay £100 out of every £500, or three times as much. The common impression was that the gas companies were so prosperous that they could afford to pay such rates; but the stupid people did not see that nearly the whole amount was transferred to the consumers. He might say that Mr. H. E. Jones, of the Commercial Gas Company, Mr. Crowther Smith, the Secretary of the Southampton Gas Company, and himself, were very well satisfied with the reception they received at the Rating Commission. It was perfectly clear that the system of rating public companies by introducing the hypothetical tenant was utterly unsatisfactory; and he might say that there was a very vicious system in vogue. He had taken the trouble—or their Solicitor had—to investigate the books of certain parishes; and they found that the Rating Surveyors were paid a percentage on the amount of the assessment sustained in the case of public companies. They were therefore not impartial; it was to their interest to force up the rating of public companies to the highest possible figure, in order that they might get as large a commission as possible. Some of the older established men refused to act on this principle. He knew of one instance where the assessor said he would only act for an agreed fee, and not on commission; but in many cases

the assessors did not do this. He thought that, the Gas Companies being partners with the consumers, it was their duty, as well as their interest, to do the best they could for their sleeping partners as well as for themselves. As to the other matter, he would not say anything about Dr. Collins and the London County Council except this—that Parliament, when they fixed the standard for the gas, and when they prescribed certain testing-stations, certainly knew that gas lost in travelling; and the Act of Parliament required that it should be tested by samples from the bulk. His contention (and it had never been answered) was that when they were required to supply 16-candle gas, it was 16-candle gas tested under certain defined conditions. If they went to the extremity of a district, they would not find the gas of 16-candle power; and he maintained it was never intended that it should be so.

The GOVERNOR: Mr. Dibdin says it was.

Mr. LIVESEY: Mr. Dibdin has never attempted to answer what I have said. I was rather amused at your speaking about the nitrate figures being reliable because they were not your own, and inferentially that your own were not.

The GOVERNOR: I do not think I said that.

Mr. LIVESEY: As to water gas, your figures are generally so complete and full that it seems almost like cavilling; but I think it would be well if you could give a little more information on this matter. You put in this statement No. 10 that the oil and spirit used were the equivalent of 42,102 tons of cannel; and then you state, in a note at the bottom of the page, that 908,546,000 cubic feet of oil gas were made. Now these terms are not convertible. Can you not give the quantity of oil? Say how much oil has been used in making water or oil gas.

The GOVERNOR: We will consider that.

Mr. LIVESEY: As to your statement about 68,000 tons of coke saved or used in the water gas, I suppose you mean not merely the coke used in making the oil gas, but the coke you would have made if you had employed coal. I find it comes to over 160 lbs. per 1000 cubic feet, which is, of course, absurd, as it should be less than one-third of that. Still, it would be very useful if that information were given, because at present there is no possibility of comparison from the figures given in the report.

Mr. B. KERSHAW advocated the use of small quantities of sulphate of ammonia for improving the appearance of lawns. He said he bought sulphate in small quantities for this purpose, but he had to pay about £75 a ton for it. He suggested whether the gas companies could not make up sulphate in small quantities for sale. In this way they would derive a good profit, and get rid of a great deal of the article.

Mr. ROKEBY PRICE expressed his gratification at what the Governor had said with regard to the conversion of the stocks. He was also glad to find that they were now going to sell their coke as they made it. [A SHAREHOLDER: We always have.] With regard to the question of an open market for disposing of their coke, he never heard of such an idea as that gas companies should confine themselves to their own districts. He desired to know what oil was used for enriching the gas.

The GOVERNOR: Russian and American.

Mr. PRICE, continuing, endorsed all that the Governor had said respecting the value of the late Mr. Phillips's services to the Company.

The GOVERNOR, in reply, said he was sure they were all extremely obliged to Mr. Livesey for what he had told them about the rating question, which that gentleman had made clearer than he himself could have hoped to do. He trusted that the result of the evidence given by Mr. Livesey and the other two gentlemen mentioned would enable the Commission to make a report which would be of some benefit. With respect to the 2½d. per 1000 cubic feet they collected from their consumers for the rating authorities, they proposed to let the consumers know in future that 2s. 7½d. was the charge for the gas, and that the other 2½d. was for the rating.

Mr. LIVESEY: I hope you will do that.

The GOVERNOR said that, with regard to the valuable suggestion of Mr. Kershaw, he never knew before that the middlemen increased the price tenfold, which they appeared to have done with the sulphate of ammonia bought by Mr. Kershaw. They might have a depôt, or depôts, where sulphate of ammonia could be sold at a reasonable cost. The suggestion should be considered. As regarded the consolidation of their stocks, they would go to Parliament with this object, not in order to improve the value of their stocks, but for the convenience of their proprietors. He then put the motion, which was carried unanimously.

Resolutions were afterwards passed declaring the dividends recommended; authorizing the Directors to raise from time to time additional capital by the creation and issue of a sum not exceeding £150,000 of new ordinary "A" consolidated stock; authorizing the Directors to raise from time to time further money by the creation and issue of a sum not exceeding £175,000 of debenture stock, to bear interest not exceeding 6 per cent.; and empowering the Directors to dispose of portions of the Company's property which were not now required for the purposes of their undertaking.

On the motion of Mr. ROKEBY PRICE—who incidentally remarked that they must all, as the Governor had said, feel very greatly indebted to Mr. Livesey—votes of thanks were passed to the Governor, Directors, and officers of the Company.

The proceedings then terminated.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Charles M. Ohren) read the notice convening the meeting; and the report and accounts, which were dealt with in last week's issue, were then presented.

The CHAIRMAN, in moving their adoption, said the report was very short; but he thought it was a true statement, so far as it went, of the position of the Company. He might say—and he thought it was only due to the shareholders that he should say—the Company was not in so satisfactory a position as the Directors would like it to be; but, on the other hand, he might also say that whatever was unsatisfactory was certainly only of a temporary nature. He took some blame to himself, because he had felt for some time that the concern was drifting—that it was not making the headway it ought to do; and, while the Directors made some efforts to put things right, those efforts were not of a sufficiently comprehensive character, and were not very successful. Last year certain circumstances came to the knowledge of the Directors which had led to a complete revolution, he thought he might say, in the management; and early this year their old Engineer, Mr. Charles Gandon, who in the past had done very good work for the Company, resigned. Previous to that—at the end of last year—the position of Manager of Works became vacant; and it was felt by the Board that it was not necessary to appoint another Manager of Works under the Engineer. Mr. Gandon told them such an appointment was necessary; but the Directors did not think so. Whether for that reason or any other he (the Chairman) did not know; but, at any rate, Mr. Gandon gave in his resignation to the Directors, which they accepted. Then they had to seek a successor. Of course, there was some difficulty in this; and the first point was to get the very best man possible. It generally happened that, when a really capable man was sought, his services were also required where he was already situated. That was so in this instance; and, although the Engineer they chose elected to come to them, he could not be spared for two or three months. In consequence, when the Engineer resigned in March last, and they went on to about the middle of June before they could get their new Engineer, the works became in a somewhat disorganized state; and things drifted worse than before. He could, however, assure the shareholders that, from all they had heard, they had in Mr. Shoubridge, the new Engineer, one of the most capable men to be found in England; and he (the Chairman) thought he might promise, on his behalf, that it would not be long before a very different condition of things was shown in the accounts. He was not going to promise much for the present half year, because, with things in a disorganized state, work of some difficulty and delicacy would have to be undertaken. For instance, when the men had been working very much as they liked, it would not do for the Engineer to try to effect a revolution all at once. But he had begun well; and he (the Chairman) felt sure, in the course of a half year or so, the accounts would be restored to their former condition, and again show the prosperity which so long characterized the Company. He did not think there would be any necessity whatever to increase the price of gas, though he did consider it possible they might have to dip to some extent in their reserve fund the next half year, but not, he hoped, in the following one. The accounts were really short by £5261, which was equal to 2½d. per 1000 cubic feet of gas. This gave the very worst impression, because they had found deficiencies in their stocks; and, instead of carrying anything to the suspense account, the Directors had cleared them all off in the past half year. Therefore they started the present half year with a clean sheet. These deficiencies in stocks accounted for something over £1000 out of the £5261 mentioned. Then there was another item in which there was a possibility of improvement—that was, in the manufacture of sulphate of ammonia. They had made 330 tons in the half year, or an average of a ton of sulphate to 169 tons of coal; while they ought to produce a ton of sulphate from 100 tons of coal. This represented a difference of £700, which might be obtained after a time. Then, in regard to the general working of the concern, there were very considerable savings which it was quite possible to effect, and which he quite expected would be made in the course of the present half year. He thought it best, and his colleagues agreed with him, that he should, in meeting the shareholders, speak the plain truth. He (the Chairman) took a certain amount of blame upon himself for having let things go on in this way as long as he had done; but there were difficulties in the way, and he might now take credit for the Board in having made a change. The drifting had certainly stopped; and he believed the old ship would again make good way at once. In the item of coal, there was another great possibility of improvement. In the past half year, the quantity of coal used had increased by 15½ per cent.; while the gas sold had only increased by 8 per cent. The difference would amount to quite £2000. This showed there had been a considerable loss of coal, which would not occur again. The fact was they had made comparatively little gas per ton of coal. Instead of producing 10,000 cubic feet per ton, they had only made 9440 feet. He was quite sure Mr. Shoubridge would not be satisfied with that. [Mr. SHOUBRIDGE: No.] He (the Chairman) mentioned these facts to indicate where the possibilities of improvement existed—a good deal might be done in sulphate, in coal, and in general working; and, besides, they would not again have the losses in stocks. He therefore anticipated that, by the end of the half year, if he was spared to meet the shareholders, he would be able to show, instead of a deficiency of £5000, one of much smaller amount. There was a very satisfactory feature in the past half year, and that was the increase in the business. In the second paragraph of the report, the Directors said: "It is satisfactory to state that the business of the Company continues to increase; over 8 per cent. more gas having been sold than in the corresponding period of 1896." He was satisfied that, by due attention to distribution, and by adopting means of encouraging the use of gas, there was the possibility of large increases in consumption in the Company's district, which would tend very greatly to increased prosperity. They could do a larger business at a lower proportion of cost than the original business; and therefore every 5 per cent. increase would bring them more than 5 per cent. increase of profit. Fortunately, they had been able to make their contracts for coal at a very slight advance; so that they would not be affected much in that respect. He also believed there was a possibility of a turn in the value of coke. Coke, tar, and ammonia had never been so low in any past half year. The price of coke had already risen slightly; and they expected that the improvement of trade (though it did not always act advantageously on gas companies) was now beginning to tell on the coke market. The demand was increasing; and the price which would be obtained for that residual in the next few months would certainly be greater than at this time last year. Before concluding, he wished the shareholders to understand that, if anything, he had made the worst of the Company's position; and he would ask them not to think the concern was going down-hill. He was quite certain it was not doing so; but, on the contrary, prosperity was within their reach, and would very soon be attained. With regard to the reserve fund, though they had to dip into it rather extensively this year (they would have to take £3669 from it in order to pay the dividends), they would have £36,852 left. He did not know how he could best explain this to the shareholders. How-

ever, he might say that he had just come from the meeting of the largest Gas Company in London, and their reserve was now down to £125,000. If their own reserve fund was in the same proportion as that, they would only have about £6000. Therefore, as far as the reserve went, they were in an exceedingly strong position; and they could well afford to take a little from it, and still maintain the price of gas to the consumers and the dividend to the shareholders. He did not like to prophesy; but, if he were to do so, he would be a very false prophet indeed if, instead of reducing the dividend, they did not before long find themselves in a position to reduce the price of gas and increase the dividend.

Dr. FREDERIC HETLEY seconded the motion.

Mr. SARD said there was a rumour about an amalgamation of the Company with the South Metropolitan Gas Company; and he would like to know whether there was any truth in it.

The CHAIRMAN replied that not only was it untrue, but there was absolutely no shadow of a foundation for it. The two Companies were very good friends; but there was no possibility of amalgamation.

The motion was unanimously carried.

The DEPUTY-CHAIRMAN (Mr. Frederic Lane Linging) proposed the declaration of a dividend at the rate of 5 per cent. per annum on the preference stock and 5½ per cent. on the ordinary stock, less income-tax.

Mr. JAMES GLAISHER seconded the proposition, which was adopted.

Mr. J. W. MORKILL moved a vote of thanks to the Chairman for the admirable manner in which he had made his statement. He did not think he had ever been at a company's meeting where the blackest side had been set forth in such a capital way as it had been that day. Although the Chairman had given them the darkest view of their position, there was in it a gleam of hope, and a very satisfactory one too in his (the speaker's) estimation. He also wished to join the Chairman's colleagues in the vote.

Mr. T. W. GUYATT seconded the motion, which was cordially agreed to.

The CHAIRMAN, in reply, said this was a very satisfactory ending to the meeting; and, on behalf of his colleagues and himself, he thanked the proprietors very heartily for the vote. The Board appreciated it more under the circumstances than they would perhaps do under ordinary ones. He could assure the proprietors that the Directors had the welfare of the concern at heart, and would be stimulated, if possible, to greater zeal in the service of the Company by the cordial thanks which had been passed. He had now to propose a vote of thanks to their officers. They had an able and devoted Secretary in Mr. Ohren, who worked with great zeal and industry in the promotion of the Company's welfare. He would also like to couple the name of Mr. Shoubridge with the vote. He had only been with them two months; and the Directors were exceedingly pleased with the way he had shaped to his work. He (the Chairman) thought it would be an encouragement to include his name and the staff in the resolution.

The DEPUTY-CHAIRMAN seconded the motion, which was heartily endorsed by the shareholders.

Mr. OHREN, in a few words, acknowledged the very kind manner in which the Chairman had proposed, and the proprietors had received, the motion. He assured them that the whole of the officers in his department did their utmost to assist him in looking after the interests of the Company.

Mr. SHOUBRIDGE said, on behalf of the engineering staff and the workmen, he had to thank the Chairman and proprietors for their testimony. He would venture so say that, notwithstanding the unfortunate results of the past half year, the Company had a staff of officers and workmen equal to those of any other gas undertaking; and he was sure they were all animated with a desire to do the best they could for the interests of the concern. He had also to thank the Chairman for the kind remarks he had made with reference to himself. He desired to take this opportunity of saying that he esteemed it a very high honour to have been elected the Engineer of this Company; and it would be his constant endeavour to do the utmost he could to further its interests in the coming year, and the whole time he had the pleasure of serving the proprietors.

BRENTFORD GAS COMPANY.

The Half-Yearly Report and Accounts.

The report of the Directors of the above-named Company, with the accounts for the six months ending June 30, have been issued in view of the general meeting next Friday. The Directors announce that there was again a serious depression in the value of residual products during the half year; but they entertain the hope and expectation that lowest values have now been reached, and that improvement in this department of the Company's business may be looked for. They express their pleasure in stating that the gas-rental shows an increase of 9·81 per cent. over the corresponding period of 1896, and of 12·8 per cent. over the first half of the previous year (1895). The consumers of gas by the automatic meter system continue steadily to increase; the number of meters let on hire by the Company on the 30th of June being 9567, compared with 6675 on June 30, 1896, or equal to an increase of more than 43 per cent. for the financial year just closed. Additional storage has been provided at the Brentford station by the reconstruction of a holder; and the manufacturing plant is being extended there and also at Southall. The Directors express their deep and sincere regret at the loss they have sustained by the death of Mr. J. Orwell Phillips, their much respected and experienced colleague. The vacancy thus created on the Board has been filled by the election of Mr. Frank Morris, who has retired from the position of Chief Engineer and Manager of the Company, which he has filled for some years. The Directors express the opinion that, "by reason of his great ability, his distinguished and successful career as a gas engineer, and his long and intimate knowledge of the Company's district and business," Mr. Morris is calculated to become a valuable addition to the directorate. The control of the manufacturing operations of the Company has been entrusted to Mr. J. Husband. The amount available for distribution is £58,622; and the Directors recommend dividends at the rates of 5, 12, and 9 per cent. per annum on the various stocks of the Company, subject to income-tax.

The accounts accompanying the report show that the amount expended for capital purposes was increased in the past six months by a sum of £11,750, of which £6318 was for new and additional meters and stoves. This brought the total outlay up to £908,673, out of the £949,980 called up—leaving a balance of £41,307. The revenue account shows that a sum of £104,040 was received for gas supplied for public and private lighting; £7157 for the rental of meters and stoves; and £19,503 for residual products—the total receipts being £130,744, as compared with £121,733 in the corresponding period of 1896. The most important rise is in the receipts for gas supplied to private consumers, which have gone up £8779. The amount expended on the manufacture of gas was £68,129, made up of the following items: Coals, £47,266; purification, £2742; salaries, £1837; wages (carbonizing), £7253; repairs and maintenance of works and plant, £9031. The amounts in the corresponding period of 1896 were: Coals, £42,487; purification, £2407; salaries, £1844; wages, £7549; and repairs, £10,491—total, £74,778. It will be noticed that while coal cost £4779 more, the wages paid for carbonizing were £297 less than in the first half of 1896. The distribution of gas cost £12,230, as against £10,761; management, £4904, as against £4393; and the total expenditure was £95,800, as compared with £91,581. The balance carried to the profit and loss account is £34,944, whereas twelve months ago it was £30,152. The accounts relating to the manufacturing operations of the Company show that 74,616 tons of coal and cannel were carbonized in the past six months, as compared with 66,742 tons in the first half of 1896—an increase of 7874 tons; the quantity of gas made being 752,204,000 cubic feet, as compared with 686,224,000 cubic feet before. The total quantity sold was 702,946,000 cubic feet, against 643,630,000 cubic feet. The following are the estimated quantities of residuals produced: Coke, 50,316 tons; breeze, 6367 tons; tar, 785,277 gallons; ammoniacal liquor, 22,966 butts (inclusive of 558 butts purchased).

BROMLEY GAS CONSUMERS' COMPANY.

The Half-Yearly Report and Accounts.

At the half yearly general meeting of this Company next Thursday, the Directors will report an increase of 7 million cubic feet of gas made in the six months ending June 30 last, as compared with the corresponding period of 1896. The revenue from the sale of gas for public and private lighting amounted to £15,613; meter rentals produced £439; residuals, £4243; and sundry receipts made up the total to £20,577. The expenditure on the manufacture of gas was £10,585 (£8092 being for coal, &c., and £2466 for wages and maintenance of works and plant); distribution cost £323; management, £1487; and the total outlay was £13,498—leaving £7079 to go to the profit and loss account. The amount available for division is £7351; and the Directors will recommend the declaration of the same dividends as before—viz., at the rates of 11½ and 8½ per cent. per annum. This will absorb £5892, and leave a balance of £1459 to be carried forward. The Directors report that the works and plant (under the supervision of Mr. W. Woodward, the Company's Engineer) are in excellent condition. The quantity of coal and cannel carbonized was 11,330 tons; and of the total make of 106,957,000 cubic feet of gas, 102,122,100 cubic feet were sold, and 1,676,000 cubic feet used on the works. The residuals produced were: Coke, 11,330 chaldrons; breeze, 1835 chaldrons; and tar, 111,126 gallons. There were 43,000 gallons of ammoniacal liquor in store on Dec. 31, 1896; and with the quantity produced in the past half year 57½ tons of sulphate of ammonia were made, and 50,000 gallons remained on hand at June 30.

MANCHESTER CORPORATION GAS SUPPLY.

The Gas Committee and the Cut-Townships—The Prepayment Meter System.

At the Meeting of the Manchester City Council last Wednesday,

Alderman GIBSON, in moving the adoption of the proceedings of the Gas Committee, reminded the Council that at the last meeting it was resolved to defer for a month the consideration of the proposals of the Committee in relation to the price of gas and meter-rents in the out-townships. After further deliberation, the Committee had passed the following resolution: "That the Gas Committee, in accordance with the wish of the City Council, having again considered the question of a reduction in the price of gas to the out-townships, respectfully submit to the Council that they see no reason to alter the opinion thrice previously arrived at; and therefore again earnestly recommend the Council to agree to a reduction in the price of gas to the out-townships to 2s. 6d. per 1000 cubic feet, and to abolish the charge for the hire of meters in such out-townships as from the 29th of September next." With regard to the prepayment meter system, it was also resolved: "That, taking into consideration the fact that the department is now losing £1300 a year on the 15,000 prepayment meters at present in use, and that to sell 30 feet instead of 25 feet of gas for a penny would be a still further loss of £3500 a year, the Council be recommended not to press the matter of a reduction at present. The Committee, however, believe they will be able to make the reduction as from the 31st of March, 1898." Alderman Gibson urged that the Council would act wisely, and in the best interests of the city, if they acceded to the recommendation of the Committee in this matter.

Mr. HAMPSON renewed his protest against conceding so much to the consumers in the out-townships. He declared that, with the rates increasing, and the Ship Canal rate falling on the citizens, it was most inopportune to accept the Committee's proposals. He thought the gas consumers in the out-districts enjoyed sufficient advantages already in having "a purer gas than that which the people of Manchester got gas becoming purer the farther it went,—and in being freed from all the unpleasantness and dirt attending gas-works." He moved that the recommendations of the Gas Committee on this point be not confirmed.

Mr. ROYLE seconded, and Mr. RICHARDS supported, the amendment.

Alderman SOUTHERN also protested against what he described as the "ill-advised generosity" of the Gas Committee.

Mr. SUTTON sided with those who thought the time was inopportune for making the proposed reduction.

Mr. ROYSE regarded the action of the Committee as right on commercial grounds. As to the charge that the time was inopportune, he held that it was never inopportune to do what was right and fair.

The amendment was adopted by 29 votes to 26.

BONUS DAY AT THE SOUTH METROPOLITAN GAS-WORKS.

To-day and Sixty and Seven Years Since.

To one whose duties call him to attend events which recur annually, the flight of time becomes stamped—especially if those events possess an interest peculiar to themselves—with a relief which one would fain hide from view. Standing in the recreation-grounds of the Old Kent Road works of the South Metropolitan Gas Company last Saturday week, and perusing the programme which had been arranged, under the direction of Mr. C. Tanner, for the annual meeting of Directors, officers, and workmen which was about to take place, it seemed almost impossible that seven years had vanished since the writer was there for the purpose of recording for the "JOURNAL" the proceedings at the "festival" which was held in celebration of the completion of the first year's operation of the bonus scheme. Yet it was so; but, on the surface, nothing seemed changed. A surprising quietness reigned over the huge works; and in the recreation-ground there were the marquees, the fluttering flags and pennants, the strains of music, and numbers of well-dressed and contented looking men and women flocking through the entrance, much the same as was witnessed seven years ago. But beneath the surface there has been a change in another direction, as is shown by the figures given in the summarized report below of the speech made during the afternoon by the Chairman of the Company and the originator of the bonus scheme (Mr. George Livesey). The knowledge that he has a little pecuniary support at his back is, to the average working man, a means of producing contentment, and is a good incentive to him to put forth his best endeavours. That support the Company have provided. The little "nest egg" and first bonus of seven years ago have grown to an amount of which numbers of the men are rightly proud; and, taking their accounts collectively, the sum now standing in the books to their credit forms an argument in favour of the scheme which few of its former opponents would feel disposed to attack. But to return to the proceedings last Saturday week. The grounds were opened shortly before three o'clock; and about an hour later, the meeting, over which Mr. GEORGE LIVESEY presided, was held in one of the marquees.

The CHAIRMAN, who, as usual, was enthusiastically received, first expressed his pleasure in again meeting the men and their wives. As much was being said this year about what had happened during the Queen's reign, he thought he could not do better than give those present a few facts relating to the state of the Company sixty years since and now. He had known the Company for 58 years; and he could say something as to its condition two years previous to that. The Companies that now formed the South Metropolitan Company only made at that period as much gas in a year as they did now in a week—perhaps not quite as much. Then at the Old Kent Road works, they had four small holders 58 years ago. The largest was only about 125th part of the size of the three-lift holder which they had there now; and about 250 times smaller than the large holder at East Greenwich. There had also been a great advance in many other directions. The wages of the labourers sixty years ago were only 3d. per hour, or 2s. 6d. per day. The stokers then worked from Sunday morning to Saturday night without interruption. There were no Saturday half holidays, nor a week's holiday in the summer; so that the young men of the present day might congratulate themselves that they were so much better circumstanced in this respect than their grandfathers and even their fathers. This state of things continued for twenty or thirty years, until, largely through the influence of one of the Company's present Directors—Mr. Robert Morton—a cessation of work took place on Sundays in the retort-houses of the London Gas Companies, of one of which Mr. Morton was then Engineer. He took the lead; and others followed him. Then the price of gas sixty years ago was 9s. per 1000 cubic feet; while now it was a quarter of that price, or 2s. 3d. This was a vast improvement, and a great benefit to the people of London. If the consumers had to pay for gas now the price they were charged sixty years ago, it would be a very heavy tax upon them. The working men in those days, however, had an advantage which they had not now—that was, house rent was much cheaper. The gas-works were then surrounded by fields and market gardens; and houses were built in what were called Church Fields, and let at 5s. 6d. per week. Bricklayers and others had got a large increase in their wages, and yet did less work for their money. He was not speaking of their own men. House rent in London had gone up more than double what it was sixty years since; and to a great extent this was caused by the increased cost of building the houses. But that was by the way. How was it that the price of gas had been reduced from 9s. to 2s. 3d.? One of the main reasons was the enormous growth of London, which had caused a large increase in consumption. When he first knew those works, they could see across the fields right away to Greenwich Hospital. The Brighton Railway was then running through the fields; but there were no houses between the works and Deptford. The tremendous increase in the population had no doubt tended very greatly to reduce the price of gas; but other things had assisted them. The change from sailing ships to steamers had enabled them to lower the price by 4d., because it now only cost about half the money to bring coal from Newcastle that it did even thirty years ago. In other ways, too, economies had been effected by men who had put their heart and brains into the work; so that, by various means, the consumers were obtaining gas at a low price compared with what was charged sixty years ago. They were receiving what might be called an "unearned increment." There were some people who said shareholders had no right to an unearned increment. Proceeding to illustrate what was meant by this term, Mr. Livesey pointed out that when the men first had an opportunity of investing in the Company's stock, they bought £5 of stock for £12. The stock had since been converted; and that which they once gave £12 for was now worth £17 10s. This was an increase of £5 10s., or not far short of 50 per cent.; and this was an "unearned increment." Coming to the main object of the meeting, he remarked that this was the eighth distribution of the bonus; and the last one amounted to a larger sum than ever before, or close upon £19,000. It was a very satisfactory thing to be able to say that a large proportion of the Company's people had been thrifty. The accumulations of the bonus and the unearned increment—the investments in, and the increased value of, the stock purchased—represented a sum of about £100,000 on June 30 last. He made out that on that date the value of the stock held by the employees was between £67,000 and £68,000, and that there was £36,800 on the withdrawal account, which made a total of £104,000. But in July there were some considerable withdrawals. The amount taken out reached nearly £6000, which made the total at present in hand about £98,000. Speaking of the withdrawable part of the bonus, he said he was afraid some of the Company's people were not quite so thrifty now as they were even a year ago. A considerable number had availed themselves of the option of leaving the money in the Company's hands; but instead of more than 40 per cent. of the men doing so, the percentage was now only 31; that was to say, 69 out of every 100 had taken out their withdrawable money—that was, half of their annual bonus, the other half being invested in stock. Of course, if the men would rather have the money out and spend it, it was no concern of the Company's. But he should like to say that thrifty men would have the best chance of promotion. For instance, in connection with the prepayment meter system, they required collectors who could be trusted; and they thought that the men who showed they were able to take care of their own money were the men who could be entrusted with the Company's. If a man was not saving and thrifty, the handling of money would be a temptation to him. It was a matter of great satisfaction to the Directors that a mutual system of providing compensation for accidents had been introduced. The rules which had been framed had been put to the men, with the extremely gratifying result that they had been unanimously adopted. He believed there was only one man who declined, out of 3000 regular hands; and this was a striking testimony to their intelligence and good feeling towards the Company.

Messrs. J. EWART and J. MEWS (two of the Directors) having addressed the meeting,

Mr. FRANK LIVESEY, the Chief Engineer, remarked that the price of gas was now 2s. 3d.; and they would much like to get it down to 2s. 2d., which would mean an additional £1 at the end of the year for the men who obtained 24s. a week. But circumstances were much against the Company at the present time. Gas was wanted; but there was not the demand for tar, coke, or sulphate of ammonia that they would like to see. As the Engineer of the Company, it was his duty to see how gas could be made cheaper; and labour-saving appliances had to be introduced. He knew this was at times rather a tender point among gas workers; but in the case of their Company, the introduction of such appliances had never reduced the number of hands. Even now they were employing 150 more men than at the corresponding time last year; and they were paying more in wages—in fact, the wages bill now came to nearly £6000 a week.

Mr. C. C. CARPENTER, the Deputy Chief Engineer, Mr. J. F. BRAIDWOOD, Engineer of the West Greenwich Works, Mr. J. TYSOE, Engineer of the East Greenwich Works, and Mr. H. C. SIMS, the Secretary of the Profit-Sharing Committee, also addressed the meeting.

Mr. FRANK BUSH, the Secretary of the Company, asked those present to carry their minds back to the year 1889. The Gas Workers' Union then said there were too many "ifs" about the scheme. All those "ifs" had disappeared; and the only objection they could have to the scheme now was that there were too many thousands of pounds. He had taken out the wages and salaries paid by the Company during the year ending June last; and no doubt it would be astonishing to many to hear that the sum approached £350,000. In addition, the bonus amounted to nearly £19,000; and since the scheme started, no less than £101,000 had been divided between the employees.

Mr. C. TANNER, sen., and some of the members of the Profit-Sharing Committee, also spoke, after which the proceedings terminated with a resolution thanking the Chairman and Directors for the interest they take in the welfare of their employees.

Tea was afterwards provided for the large company in the marquees. During the evening, the Company's brass bands and the 1st South Staffordshire String Band performed several selections of music. There was also a display by the Company's No. 1 Division of the St. John's Ambulance Brigade; and an attractive concert wound up the enjoyment of the day.

Mullingar Water Supply.—The Local Government Board for Ireland have, subject to certain formalities being complied with, assented to the borrowing by the Mullingar Board of Guardians of the sum of £10,000 for the construction of water-works. A tender submitted by a local contractor (Mr. R. Mullaly) has been accepted for carrying out the scheme.

New Joint-Stock Companies.—The Automatic Gas Cooker Syndicate, Limited, has been registered with a capital of £10,000, in £1 shares, to carry on the business of gas-stove manufacturers, gas engineers, machinists, fitters, founders, millwrights, metal tube manufacturers, wire drawers, &c. The Knighton Gaslight, Coal, and Coke Company, Limited, with a capital of £2000, in £5 shares, is to incorporate a Company constituted by deed of settlement, dated Nov. 1, 1852, and incorporated under the Joint-Stock Companies Act, 1856, on Oct. 31, 1856. All the shares have been taken up and paid for in full. The Gas-Engine (England) Development Syndicate, Limited, has been registered with a capital of £10,000, in £1 shares, to adopt an agreement with R. M. Houldsworth, and to "carry on business as stock and share dealers, public liquidators, company promoters, bankers, financiers, &c."

Gas and Electric Lighting Affairs at Chorley.—At the last monthly meeting of the Chorley Town Council it was reported that the Local Government Board had sanctioned the borrowing of £7714 for gas-works purposes, but declined to sanction the erection of a gasholder, on account of its encroachment on the Cattle Market. Alderman Howarth asked what the Local Government Board had to do with the alleged encroachment; and the Mayor, in reply, said there was a clause in their Local Act to the effect that they had not to trespass on the Cattle Market. The Town Clerk remarked that if the Local Government Board had nothing to do with the encroachment, they had everything to do with the granting of the money for extensions. A notice was received from the Electric Supply Corporation, stating that it was their intention to apply for electric lighting powers within the borough of Chorley. The Town Clerk was instructed to take the requisite steps for opposing the application; and he was directed to apply during next session for a Provisional Order to confer powers upon the Corporation for the supply of electricity within the borough.

ELECTRIC LIGHTING NOTES.

The West Hartlepool Town Council last Tuesday adopted a scheme propounded by Professor Kennedy for lighting the town by electricity, at an expenditure of from £25,000 to £27,000, exclusive of engineering charges.

Yesterday week the Colne Town Council discussed a recommendation from the Gas Committee regarding the adoption of the electric light. It was resolved that powers should be sought during the next session of Parliament for supplying electricity within the lighting district of the borough, and the Town Clerk was instructed to take necessary steps.

The scheme for lighting Lincoln by electricity is rapidly being developed, and in a very short time the buildings will be in course of erection. It was only about a month since that the necessary parliamentary powers were obtained; but at the City Council meeting last Tuesday, tenders for all the plant required were accepted, and contracts were also entered into for the erection of the main buildings, the construction of the chimney, and the supply of the necessary ironwork. The contract price for the buildings is £3756; for the chimney, £1175; and for the ironwork, £509. The accepted tenders for the plant amount to close upon £9000. The Council are seeking the sanction of the Local Government Board to the borrowing of £21,000.

The Hampstead Vestry's Electric Lighting Department have issued their report. They are saddled with an overdraft at the bankers for no less a sum than £22,000 odd; the whole capital expenditure being upwards of £83,000. This trifling drawback, however, is but little commented upon; but the encouraging increase of private consumers (334 per cent. of lamps for the period) is naturally emphasized. An experiment has been authorized for the consumption of electricity in connection with a patent demand indicator (50 of these instruments being already ordered), whereby the consumer is allowed a reduction if a certain maximum demand of current for the half year is shown. This decision was arrived at after a long discussion at last Thursday's meeting of the Vestry.

The Kingston-on-Thames Town Council require a further loan of £20,000 for purposes connected with their electric-lighting undertaking, which were explained to Lieut-Col. Smith at an inquiry held by him, on behalf of the Local Government Board, on the 30th ult. The sum named includes £5406 which has been spent in excess of the loans already granted, and the remainder is to be used for extensions. The alterations and extensions at present proposed will absorb £12,442; and this will permit of an additional 6000 lamps being used simultaneously, which it is expected will carry the undertaking on to the end of 1898, by which time it is hoped the demand on the rates for the repayment of capital will be reduced to nearly vanishing point. It was admitted by the Electrical Engineer (Mr. J. E. Edgcome) that inquiries as to the prospect of people taking the light in the districts where new mains were to be laid were not encouraging; but his experience was that, when the current was made available, people often took it.

The Ashton-under-Lyne Town Council, having decided to establish works for the supply of electricity both for power and lighting purposes, and in combination therewith plant for the destruction of refuse, recently made application to the Local Government Board for sanction to borrow £34,500 for carrying out the first portion of the scheme, and £1750 for the latter. Colonel A. G. Durnford has held the customary inquiry on behalf of the Board; and very full information was laid before him by the Town Clerk (Mr. C. Gartside). It appears that, in addition to supplying electricity for lighting purposes, the Corporation have made a provisional agreement with the British Electrical Traction Company for furnishing the energy required for working a tramway line which is to be laid between Oldham, Ashton-under-Lyne, and Hyde. The Company have agreed to take, during the first year, a minimum supply of not less than 150,000 units; and thereafter a minimum of 350,000 units. An inquiry made early in 1896 as to the number of persons and firms who were prepared to adopt electric lighting was described as having resulted "fairly satisfactorily."

Fenton District Council Gas-Works.—The net profit on the Fenton Gas-Works for the year ending March 31 last amounts to £1581, which, on the recommendation of the Gas Committee, the District Council have agreed to apportion as follows: Gas-stove account, £200; reserve fund, £500; and district fund, £881.

The Cost of the Parliamentary Proceedings in Connection with the Gravesend Water Question.—At a meeting of the Gravesend Town Council last Wednesday, the Town Clerk reported that the Gravesend and Northfleet Water Committee had considered a list of the expenses incurred in connection with the movement to municipalize the water-works, and it appeared that the sum of £965 was properly chargeable to Gravesend and £720 to Northfleet. Alderman Fletcher said the accounts in this matter must be an eye-opener to the Council, and all this heavy expenditure had resulted in nothing. The Water Company had been also put to expense, and there was no doubt that the ratepayers would have to pay this as well.

The Proposed Sale of the Liskeard Water-Works.—A meeting of the shareholders of the Liskeard Water Company was recently held to consider the proposal to sell the undertaking to the Town Council of Liskeard for the sum of £16,500. In a circular issued to the shareholders the Directors recommended the sale; being of opinion that it "would be to the interest of the shareholders to accept the offer of the Corporation, seeing the tendency in the present day for municipal bodies to acquire the right to supply water either by agreement or under compulsory powers." Mr. L. C. Foster, the Chairman of the Company, presided, and expressed the opinion that the price offered was fair both to the Company and to the Corporation. Resolutions were unanimously adopted approving of the sale for the sum of £16,500; the Company retaining their reserve fund, and providing for the compensation of their officials on a scale to be settled by the Directors. It was also decided that, as soon as the contract for sale is entered into, the Company shall be registered under the Companies Acts, in order to distribute the purchase-money among the shareholders, and provide for the winding up. The Chairman and the Secretary (Mr. B. Child), or one of them, were authorized to make the applications for the purpose of giving effect to this resolution.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Although I said last week that I might return to the subject of the North British Association meeting at Ayr, now when the time has come I feel that I have little to add. The meeting is a pleasant memory, all the more pleasing, I suppose, because the programme of business did not hold out great hope of anything brilliant transpiring, and therefore much less than ordinary was found to be quite satisfying. It was stated that there had been difficulty in getting papers for the meeting. This was apparent when the two Vice-Presidents had to step in to fill the breach. It is a pity that such should be the case; but it cannot be overlooked that circumstances are at present against good papers being procured. Within even the past ten years the science of gas manufacture has greatly changed. The man in charge of large works, with coal breaking and conveying plant, mechanical stoking, and apparatus for dealing with residuals, has little in common with the man in charge of works where these do not exist. It may be quite interesting to the manager of a small works to hear his brother manager of a large works describing his methods of working. But it cannot be of much interest to the large man to lay his jewels before an audience who, in the nature of things, cannot fully appreciate them; and it must be still less interesting to the large man to listen to the doings of the small man. Thus two classes are being formed by circumstances over which nobody has, or can have, any control. In this state of matters, the great majority of the members of the Association being managers of small works, it is perhaps as well that too ambitious programmes should not be aimed at; and thus the general satisfaction with the meeting this year—which admittedly was not a high-class one—may be accounted for on deeper grounds than anything of the nature of hap-hazard. I fancy that a few papers of a practical nature may be relied upon to produce more discussion, or conversation, than the same number of communications on scientific questions, or papers upon large subjects, which everyone cannot follow on the spur of the moment. It was very pleasing to see Mr. T. Whimster, of Perth, made an honorary member. Mr. Whimster thoroughly deserved the honour, on account of his long and faithful service in Perth, and his devotion to the Association, as well as for the progressive spirit which he manifested down to the last day he was in office. The roll of new members, both as to numbers and quality, was also a pleasing feature of the meeting. The Committee seem to be doing their part in bringing members forward. If the members would support the Committee, the prosperity of the Association would be assured.

The accounts of the Glasgow Corporation Gas Department for the year ending May 31 last have been issued to the members of the Corporation. They show a continued course of prosperity, which, apart from the excellent management, that everyone acquainted with the undertaking admits, is not to be wondered at, when the rapid extension of the city is considered. The bulk of coal carbonized was 554,517 tons, and the quantity of gas sold was 4,625,781,000 cubic feet, or 366,612,000 cubic feet, equal to 8·6 per cent., more than in the year preceding. The gross revenue for the year amounted to £607,622—an increase of £1828, although the price of gas was 2d. per 1000 cubic feet lower than in the preceding year. Of the total revenue, £492,578 was derived from the sale of gas—an increase of £4437. Residual products realized £110,777. The gross expenditure amounted to £505,683, to which has to be added depreciation written off capital, amounting to £33,642; making a total of £539,325, and leaving £68,297, which has been carried to the credit of profit and loss account. After paying annuities on stock, £33,603; interest on borrowed money and redeemed loans, £28,464; and setting aside for sinking fund, £5900—in all, £67,968—there remains a surplus on the year's operations of £329. This surplus, with the balance of £3 18s. 10d. from last year, and the surplus on the electricity account of £1527, make up a total of £1859, out of which the Committee have transferred to the contingent fund a sum of £1500; leaving a balance to be carried forward of £359. The manufacture of gas cost £414,280; repairs and maintenance of works and plant, £51,170; rents, rates, and taxes, £25,372; management, £9574; and law and parliamentary charges, £402. The capital expenditure during the year amounted to £1,239,851. The sinking fund now stands at £331,023. The chemical market has been unfavourable for the Corporation; the average prices received per ton of coal carbonized having been 2s. 1·71d., as compared with 2s. 6·67d. for the previous year—a reduction equivalent on the working of the year of £11,460. Should the present low price be continued, a further reduction from this source of £13,000 is anticipated. Coke realized £4600 more; the increase being due to the greater quantity sold. Notwithstanding the prospective decrease of income from tar and liquor and the increased expenditure on coal account, the Gas Committee, in view of the favourable balance submitted, recommend that the price of gas be continued at 2s. 2d. per 1000 cubic feet.

In Hamilton, notwithstanding the excellent work done by Mr. W. Ewing, the Manager of the Corporation Gas-Works, there are some members of the Corporation who will not be convinced that matters are in a good way. Bailie Tainsh is one of these; and Treasurer Keith is another. At a meeting of the Corporation this week, the Gas Committee recommended that governors should be placed upon the public lamps, at a cost of £80. They also reported that Mr. Ewing had estimated a gross profit on the working of the current year of £2635, and the Committee recommended that the price be continued at 2s. 1d. per 1000 cubic feet, for gas of 24-candle power. Bailie Tainsh objected, and moved that the price be raised to 2s. 2¼d. They had, he said, added £2400 to their capital account during the past three years, most of which, he considered, should be charged to revenue. Both he and Treasurer Keith, who seconded him, were vigorous upon the point that a sum—one said 10, and the other 3 per cent.—should be set aside annually for depreciation, otherwise they could not be said to be paying their way. Now these men were talking nonsense. It is a financial question how far a corporation should go in the way of paying off the debts upon properties owned by them; but there can be no question here. If £2400 has been added to capital account in three years, the capacity of the works has been more than trebled for that addition to capital. The out put of gas has risen from 80 to 110 million cubic feet, and the capacity is 300 million cubic feet. The works and plant have a structural value of £53,674; but since 1880 there have been allowed for depreciation

sums amounting to £14,000, which leaves the book value of the works and plant at £39,674. Against this there is a loan capital of only £33,660. The works are thus being appreciated; and while this is going on, to allow for depreciation would be folly. I have no doubt the Corporation, whenever the works begin to deteriorate, will set aside sufficient to meet it, which they will be able to do because no part of the revenue will require to be expended upon the works; or, on the other hand, they may maintain the works out of revenue year by year, and thus have no depreciation. One councillor—a Mr. Pollock—holds the very extraordinary notion that the gas-works being the property of the householders, and there being many householders who do not burn gas, the undertaking should be managed so as to produce a handsome profit for the advantage of the burgh. Bailie McHale, the Convener of the Gas Committee, put that gentleman right when he pointed out that by reductions in the price of gas—from 2s. 11d. to 2s. 1d.—they had given the community £10,000; and since 1880, notwithstanding the extensions and renewals at the works, the annual sum required to meet interest on capital had been reduced from £1300 to £900. This year, he said, would really be the first in which the Manager would have an opportunity of showing what could be done with the new works. The recommendations of the Committee were adopted by a majority; and thus the two malcontents were defeated.

At a meeting of the Glasgow Corporation last Thursday, a gentleman who is smitten with a mania for what he considers economy in the conducting of public undertakings moved that a Committee be appointed to consider the advisability of their having only one Treasurer for the Corporation, instead of having separate Treasurers for each branch of the service. The Corporation, however, took the view that one Treasurer would not lead to economy, as they would require responsible men at the head of the Water, Gas, Tramway, and Police Departments, in addition to the superior person who would be over all; and they rejected the proposal.

At a meeting of the Arbroath Gas Corporation last night, Provost Grant presiding, it was reported that the Finance Committee had been in communication with the Bank of Scotland, asking if they would agree to grant the Corporation small loans, not exceeding £2000 at a time. The loans thus obtained would be placed in the Corporation general account. A letter was read from the Bank of Scotland, in answer to the communication with regard to the loans, in which they agreed to allow them at reduced terms of interest. In terms of the letter from the bank, it was agreed to borrow £1000 for general purposes. Mr. Sutherland, the Convener, in moving the adoption of the report, said that at the last meeting of the Corporation a conversation arose with regard to this, and that dissatisfaction had been expressed at the rate of interest charged. The Finance Committee had taken up the matter, and the result was that the loans were to be raised at a lower rate of interest than in the past. The interest would no doubt vary from time to time; but he did not think it would be above 3 per cent., and that was about half of what they were paying formerly. He therefore moved the approval of the minutes. This was agreed to.

The annual meeting of the Coatbridge Gas Company was held on Tuesday. The report of the Directors, already noticed, was adopted; and in terms of it, dividends at the maximum rates of 10 and 7 per cent. were declared, and the price of gas was reduced from 2s. 11d. to 2s. 6d. per 1000 cubic feet.

Bailie Wright, of Perth, who is Convener of the Works Committee of the Perth Gas Commission, has acquired the gas undertaking at Bankfoot, a village near Perth; and he has inaugurated his advent as proprietor by abolishing meter-rents and reducing the price of gas by as much as 3s. per 1000 cubic feet.

It is with a feeling of regret that I have this week to record the entire collapse of the electric light in Edinburgh on Monday night. The electric lighting scheme has been pushed forward with a boldness which must command respect, if not admiration. For one thing, the Electric Lighting Committee have removed the gas-lamps from the streets which they light; and certainly the appearance is improved by the absence of disused and neglected lamp-pillars. But an experience such as that of Monday night raises a doubt as to the wisdom of the policy. The mishap took place at midnight on a summer night, and it was remedied about three o'clock in the morning. There was thus about the least possible inconvenience caused to the public. It would have been otherwise, however, had it occurred at a time when there was a heavy traffic on the streets, and while business was being transacted in the shops. It almost amounts to irony to read that within the electrical station candles had to be used while the staff were going about trying to discover the fault. While this process was in operation, there were repeated calls, personally and by telephone, at the electric lighting station, by those who wanted the light and could not get it; but no response could be obtained. The doors were locked and not even the police, whose offices were in darkness, could get an answer to their demand to know what was wrong. Perhaps it was better that the staff should apply themselves to remedying the defect, than waste time in giving answers or listening to denunciations. Next day the explanation which was afforded was that a water-main had burst and flooded a conduit through which their main feeders ran, with the result that the current was carried off by the water, and ran to earth. Surely, in such a state of matters, there was very great danger to the lieges. Water is about as good a conductor of electricity as there is, and to have had powerful currents flying about by its means might have led to disaster. Happily, nothing of the kind happened; but it is a new risk to which humanity is exposed. This Edinburgh incident will be a memorable one. There have been breakdowns in the machinery before; and, to guard against them, duplicate plant—or at all events multiform plant—has been introduced. But here is another and much simpler method of breaking down: Turn water into the culverts and the light is gone. Most sciences owe their advancement in great part to experiences gained in the school of adversity; and that of electric lighting seems to be no exception to the rule.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 7.

Sulphate of Ammonia.—The market remains without animation; and the closing quotations are £7 8s. 9d. to £7 10s. per ton f.o.b. Leith, £7 10s. per ton f.o.b. Hull, and £7 11s. 3d. per ton f.o.b. Liverpool. Direct export orders are still very scarce; and the buying continues to be mainly to cover

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 314).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	9 Apl.	10½	Alliance & Dublin 10 p. c.	23–25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	17½–18½	..	4 1 1
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	106–108	..	4 12 8
200,000	10	27 May	7	Belgrano (B. Ayres), Limited	9½–10	..	7 0 0
100,000	Stck.	29 June	5	Do. 5 p. c. Deb. Stk	103–106	..	4 14 4
200,000	5	27 May	6½	Bombay, Limited	6⅞–7½	..	4 9 7
40,000	5	,,	6½	Do. New, £4 paid	5¼–5¾	..	4 10 7
380,000	Stck.	26 Feb.	12	Brentford Consolidated	300–305	..	3 18 8
240,000	,,	,,	9	Do. New	223–228	..	3 18 7
50,000	,,	,,	5	Do. 5 p. c. Pref.	145–150	..	3 6 8
159,375	,,	11 June	4	Do. 4 p. c. Deb. Stock.	135–139	+3	2 17 6
220,000	Stck.	26 Mar.	11½	Brighton & Hove Original	273–278	..	4 2 8
208,820	,,	,,	8½	Do. A Ord. Stk.	201–206	..	4 2 6
933,500	Stck.	26 Feb.	5	Bristol, 5 p.c. max.	130–135	..	3 14 1
420,000	20	26 Mar.	11½	British	56–57	..	3 18 11
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	23–25	..	4 12 0
71,000	10	,,	8½	Do. 7 p. c.	18–20	..	4 5 0
500,000	10	28 Apl.	6	Buenos Ayres (New) Limited	10¾–11½	..	5 4 4
200,000	100	1 July	6	Do. 6 p. c. Deb.	—	..	—
150,000	20	15 July	8½	Cagliari, Limited	30–32	..	5 3 1
100,000	10	11 June	8	Cape Town & District, Ltd	16½–17½	..	4 11 8
50,000	50	3 May	6	Do. 6 p. c. 1st Mort.	58–59	..	5 1 8
550,000	Stck.	9 Apl.	13½	Commercial Old Stock	343–348	..	3 17 6
165,000	,,	,,	10½	Do. New do.	257–262	..	4 0 1
165,000	,,	11 June	4½	Do. 4½ p. c. Deb. do.	155–158	..	2 16 11
800,000	Stck.	11 June	13	Continental Union, Limited.	253–258	..	5 0 9
200,000	,,	,,	10	Do. 7 p. c. Pref.	212–217	..	4 12 2
51,600	Stck.	26 Feb.	14	Croydon Com'cial A 10 p. c..	317–322	..	4 6 11
163,400	,,	,,	11	Do. B 7 p. c.	255–260	..	4 4 7
535,000	Stck.	26 Feb.	5¼	Crystal Palace Ord. 5 p. c. Stk	139–142	..	3 13 11
60,000	,,	,,	5	Do. 5 p. c. Pref.	140–143	..	3 9 11
486,090	10	29 July	11	European, Limited	24½–25¾*	..	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	17½–18½*	..	4 9 3
5,896,590	Stck.	12 Feb.	12½	Gaslight & Coke, A, Ordinary	313–318	..	4 0 2
100,000	,,	,,	4	Do. B, 4 p. c. max.	113–118	..	3 7 10
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	318–323	+1	3 1 10
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150–155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	220–225	..	3 6 8
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	205–210	..	3 6 8
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	317–322	+2	3 2 2
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	182–187	..	3 4 2
1,061,150	,,	11 June	4	Do. 4 p. c. Deb. Stk.	138–141	..	2 16 9
294,850	,,	,,	4½	Do. 4½ p. c. do.	155–158	..	2 16 11
908,000	,,	,,	6	Do. 6 p. c. do.	207–212	+2	2 16 7
70,000	10	13 May	6	Hongkong & China, Limited	13½–14½	..	4 2 9
3,800,000	Stck.	13 May	10	Imperial Continental	218–223	–4	4 9 8
376,400	100	3 Aug.	4	Do. 4 p. c. Debs. Red.	99–102*	+1	3 18 5
473,600	Stck.	12 Feb.	3½	Do. 3½ p. c. Deb. Stk	104–107	..	3 5 5
75,000	5	29 June	6	Malta & Mediterranean, Ltd.	5½–6	..	5 e 0
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	112–114	..	4 7 8
250,000	100	,,	4½	Do. 4½ p. c. Debs.	107–109	..	4 2 7
541,920	20	11 June	5	Monte Video, Limited	15–16	..	6 5 0
150,000	5	27 May	8	Oriental, Limited	8¼–8⅝	..	4 11 5
135,000	5	,,	8	Do. New, £4 10s. paid	7⅛–7⅜	..	4 12 10
15,000	5	,,	8	Do. do. 1879, £1 paid	1⅞–2	..	4 0 0
60,000	5	26 Mar.	7	Ottoman, Limited	5–5⅛	..	6 7 3
420,000	100	3 May	6	People's Gas | 1st Mtg. Bds.	104–109	..	5 10 1
500,000	100	1 June	6	of Chicago | 2nd Do.	105–110	..	5 9 1
250,000	10	27 May	10	San Paulo, Limited	14⅜–15½	..	6 9 0
5,475,000	Stck.	26 Feb.	5½	South Metrop., 4 p.c. Ord.	146–149	..	3 10 5
1,416,667	,,	15 July	3	Do. 3 p.c. Deb. Stk.	105–109	..	2 15 0
60,000	Stck.	12 Mar.	11½	Tottenham & Edmonton, A	275–285	..	4 0 10
60,900	,,	,,	8½	Do. B	190–200	..	4 5 0
182,380	10	27 May	10	Tuscan, Limited.	13½–14½	..	6 18 0
149,900	10	1 July	5	Do. 5 p. c. Debs. Red.	100–103	..	4 17 1
				WATER COMPANIES.			
746,159	Stck.	29 June	10½	Chelsea, Ordinary	334–338	..	3 2 1
150,000	,,	,,	5	Do. 5 p. c. Pref.	177–180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p. c. Pref. Stk., 1873	157–160	..	2 16 3
175,785	,,	26 Mar.	4½	Do. 4½ p. c. Deb. Stock	160–165	..	2 14 6
1,720,560	Stck.	9 Apl.	7	East London, Ordinary	223–228	..	3 1 4
554,740	,,	29 June	4½	Do. 4½ p. c. Deb. Stk.	163–166	..	2 14 3
390,000	,,	,,	3	Do. 3 p. c. Deb. Stk.	106½–107½	..	2 15 10
700,000	50	11 June	7½	Grand Junction, 10 p.c. max.	120–125	..	3 0 0
295,000	Stck.	26 Mar.	4	Do. 4 p. c. Deb. Stk.	148–153	..	2 12 4
708,000	Stck.	12 Feb.	13†	Kent	347–351	..	3 13 10
160,000	,,	,,	7	Do. New, 7 p. c. max.	212–217	..	3 4 6
1,043,800	100	29 June	9½	Lambeth, 10 p. c. max.	285–290	..	3 7 2
406,200	100	,,	7½	Do. 7½ p. c. max.	217–222	..	3 7 7
350,000	Stck.	26 Mar.	4	Do. 4 p. c. Deb. Stk.	147–150	..	2 13 4
500,000	100	12 Feb.	13	New River, New Shares.	437–442	..	2 18 9
1,000,000	Stck.	29 July	4	Do. 4 p. c. Deb. Stk.	151–154*	..	2 11 11
902,300	Stck.	29 June	5	S'thwk & V'xhall, Ordinary	160–163	..	3 1 3
126,500	100	,,	5	Do. Do. 7½ p. c. Max.	151–154	..	3 4 11
489,200	Stck.	,,	5	Do. Do. 5 p. c. Pref.	173–178	..	2 16 2
1,019,585	,,	9 Apl.	4	Do. 4 p. c. A Deb. Stk.	145–148	..	2 14 2
1,155,066	Stck.	11 June	10	West Middlesex	312–317	..	3 3 1
200,000	,,	,,	4½	Do. 4½ p. c. Deb. Stk.	163–166	+1	2 14 3

† Next dividend will be at this rate. *Ex div.

speculative sales. Supplies are ample to meet current demand; but makers are not pressing sales. For shipment over the autumn months, inquiry has declined; and nothing over prompt prices would be obtainable. For spring delivery, there would be buyers at a small premium—too small to meet sellers' views. Makers are not offering, unless at a premium of 5s. to 7s. 6d. per ton.

Nitrate of Soda is dull at 7s. 4½d. per cwt. for ordinary, and 7s. 6d. per cwt. for fine quality, on spot.

LONDON, *Aug.* 7.

Tar Products.—There is a determined effort on the part of some dealers to depress benzols; and, unfortunately, weak sellers have lent themselves to this departure. At the time of writing, however, there seems to be a little better feeling, and, in one instance, a higher price than quoted below has been paid. Naphthalene continues a dead letter, which is a disappointment to producers. Creosote oils are scarce, with a rising tendency. A distinct improvement is noted in carbolic acid; and both solvent and crude naphthas are fairly steady. Pitch remains weak, with only a poor outlet for the immediate future.

To-day's values may be taken as: Tar, 16s. to 20s. Pitch, 17s. 6d. to 20s. Benzols, 90's, 1s. 11d.; 50's, 2s. Toluol, 2s. 2d. Solvent naphtha, 1s. 7d. Crude, 30 per cent., naphtha, 11d. Creosote, 2¼d.; liquid, 3d. Heavy oils, 42s. 6d. Carbolic acid, 60's, 1s. 11d. Naphthalene, 40s.; salts, 20s. Anthracene, "A" quality, 6d.; "B" quality, 5d.

Sulphate of Ammonia is showing a good deal more life and activity than has been seen for some time. There is a firm market for both prompt and forward delivery. The sphere of consumption has greatly enlarged during the past year. This is likely to be of permanent importance to this market. The value at all ports may be taken as about £7 10s., less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Nothing new can be reported with regard to the coal trade of this district, except that the steadily widening area of the engineering trades lock-out and strike is beginning to make itself felt on the demand for manufacturing classes of fuel, and by lessening the consumption of coke will also further tend to throw increased quantities of slack upon the market. Steam and forge coal move off moderately, and engine fuel is still in good demand. Pits are in very few cases working more than four days per week, and stocks go on accumulating. Prices at the pit mouth average 9s. 6d. to 10s. and 10s. 3d. per ton for best Wigan Arley; 8s. to 8s. 6d., for Pemberton four feet and seconds Arley; 6s. 6d. to 7s., for common house-coal; and 6s. to 6s. 3d., for steam and forge qualities. Engine fuel is quoted at 3s. 6d. per ton for common, 3s. 9d. to 4s. 3d. for medium sorts, and 4s. 6d. to 5s. for best qualities. The business doing for shipment is moderate, with ordinary steam coal averaging 7s. 6d. to 7s. 9d. per ton delivered at the Garston Docks or the High Level, Liverpool.

Northern Coal Trade.—There has been a strong demand for steam coals for export this week, and best Northumbrian kinds have been very firm at 8s. 9d. per ton, f.o.b; second-class steam at 8s. to 8s. 3d. per ton; and steam smalls at 3s. 6d. to 3s. 9d. per ton. In the gas coal trade, there are some local contracts now in the market. Prices seem to be stiffening, as the demand increases. At present, the export of gas coals is rather heavy; and with a better local consumption, the producers are generally asking 7s. 6d. per ton, f.o.b., for best Durham gas coals. Manufacturing coals are dull; the strike of the engineers having reduced the consumption at some works. Coke is very firm, both for export and for local blast-furnace use. For export, about 16s. 6d. per ton, f o.b., may be taken as the fair average quotation; while for local use, 13s. 6d. per ton at the furnaces is the current quotation. There is no alteration this week in gas coke.

Scotch Coal Trade.—There is great activity in every branch. So far, the engineering trouble has not interfered with the trade. There are inquiries for forward contracts; but the prices offered are not sufficient to lead to much business being done. Prices remain unaltered: Main, 6s. 3d. to 6s. 6d. per ton, f.o.b. Glasgow; ell, 7s. to 7s. 6d. per ton; and splint, 6s. 9d. to 7s. per ton. The shipments for the week amounted to 185,694 tons—an increase upon the preceding week of 55,762 tons, and upon the corresponding week of last year of 8383 tons. For the year to date, the total shipments have amounted to 4,446,618 tons—an increase of 152,799 tons upon the corresponding week of last year.

Reductions in Price.—Owing to the large increase in the number of consumers, and to the additional demand for gas for motive power, the Directors of the Worcester Gas Company have been enabled to reduce the price of gas by 2d. per 1000 cubic feet from the 1st ult. The Directors of the Tayport Gas Company have reduced the price of gas from 5s. 10d. to 5s. 5d. per 1000 cubic feet.

The Proposed Purchase of the Mid-Sussex Water-Works by the Cuckfield District Council.—In the "JOURNAL" last week we announced the appointment of Mr. J. Mansergh, M.Inst.C.E., as the Arbitrator for the Council in the above-named matter. We learn that the Company have instructed Mr. R. E. Middleton, M.Inst.C.E., to act in that capacity for them, and have retained Mr. Cripps.

The Assessment of the Lancaster Corporation Gas-Works.—Some few months since, the rateable value of the Lancaster Gas-Works was raised by the Assessment Committee from £3250 to £5508. The Gas Committee protested against this; and, as already reported, an interview took place early this year between the Assessment Committee and the Mayor (Mr. N. W. Helme), the Town Clerk (Mr. Hughes), the Gas Engineer (Mr. C. Armitage), and Mr. Thos. Newbigging, with the result that it was agreed that the rates should be paid on the 1892 valuation, pending a re-valuation on the completion of the annual accounts to March 31 last. It was reported at the last meeting of the Council that the Assessment Committee had consented to reduce the rateable value to £4400; and in this the Gas Committee have cordially concurred.

JOSEPH AIRD,

WELLINGTON TUBE WORKS,

GREAT-BRIDGE,

STAFFORDSHIRE.

HIGHEST QUALITY

TUBES AND FITTINGS

GAS, STEAM, WATER, GALVANIZED TUBES and FITTINGS in all Sizes.

LARGE SIZED TUBES FOR "COLLIERIES," FITTED WITH JOSEPH AIRD'S PATENT DOUBLY SECURE FLANGED JOINT, OR JOSEPH AIRD'S PATENT "EXPRESS" LOCK-JOINT.

TUBES MADE LAPWELDED ALL SIZES TO TWELVE INCHES.

Illustrated Price Lists on Application.

LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

Sales of Shares.—Last Wednesday, 60 fully-paid £5 shares in the Wantage Water Company, on which 5 per cent. is being paid, were sold by auction at an average of £6 10s. each. Some original £25 shares in the Winchester Water and Gas Company were sold at an average of £64 each. At the Bolton Public Sale Rooms on Thursday, £145 of "B" stock in the Farnworth and Kearsley Gas Company was sold for £270.

The Winding-Up of the Matlock Bath Gas Company, Limited.—In connection with the winding-up of the affairs of the above-named Company, in consequence of the transfer of the works to the District Council, a second and final dividend of £1 6s. 2d. has been paid to the shareholders; making a total distribution of £6 6s. 2d. per £5 share. The market value of the shares before the parliamentary proceedings was £10 10s.

The Relations of Water Companies and Consumers in New York.—According to a decision recently given in the Supreme Court of New York State, water companies have no right to force water users to pay for water not used; and contracts stipulating that the water-rates shall be paid in advance are declared void. The case at issue was that of the lessee of a theatre at Nyack; and the suit was to make permanent an injunction restraining the Water Company from withholding the supply to the building. The former lessee failed to pay the water-rent; and the Company wanted the present lessee to pay the back rent of $60, as well as that for the next quarter in advance. The decision will affect a large number of water companies in New York State who supply water only on condition that the rates are paid in advance.

The Ampthill Water-Divining Case.—Mr. William A. Casson, District Auditor, has sent to "The Times" the reasons, as entered by him in the Ampthill Urban District Council's ledger, for surcharging certain members of the Council in respect of fees paid to a water diviner. A statement of this case was published in our columns on June 1. Mr. Casson drew up these reasons in view of a possible appeal to the Local Government Board or the High Court against the surcharge; and he has forwarded them to the Urban District Council in order to give the surcharged councillors full and fair opportunity of stating their case. He quotes the report of Mr. Leicester Gataker, the diviner engaged by the Council, to whom payment was made as follows: "To professional visit and search for water, fee, £10 10s.; travelling expenses, £2 18s. 7d.—total, £13 8s. 7d." Mr. Casson disallowed the £13 8s. 7d. because he was satisfied that Mr. Gataker had represented to the Council that he could discover subterranean sources of water by means of a power of "divination" or "dowsing;" that he had, in fact, gone over lands in the district professing to seek water by divining "with the hands alone;" and had, therefore, with a view of obtaining the fee paid to him by the Council made pretence to a power within the meaning of the decision in *Regina v. Maria Giles*. He regarded Mr. Gataker's claim as an imposition on the minds of the credulous, and treated him as a person whom it was not competent for the Council to employ for the purpose for which he had been employed, and the payment for his employment as one for which there was no authority in law.

The New Water Supply for Eastbourne.—Last Friday, the Duke of Devonshire, as Chairman of the Eastbourne Water Company, formally inaugurated the new additional supply of water, which has been obtained from the latest of the Company's works at Friston, details of which were given in the "JOURNAL" last week. The practical effect of this act is, with the supplies already derived from Holywell and Wannock, to place Eastbourne in the possession of an entirely new water supply, which Sir E. Frankland declares, as the result of analysis, "cannot be surpassed for organic purity and excellence of quality by any other supply in Great Britain." The work of laying the new main across the downs behind Beachy Head, a distance of nearly four miles, from Friston to the high-service reservoir at Meads, has been performed by Messrs. J. Aird and Sons during the past two months; the Company, in accordance with the pledge given on their behalf before the Parliamentary Committee, having used every endeavour to expedite the work. The Duke of Devonshire, who arrived in Eastbourne at half-past eleven o'clock in the morning, drove direct to Black Robin Farm, near Beachy Head, where his Grace, having received the Mayor (Alderman Skinner) and Corporation, turned on the water into the main communicating with the reservoir; the Duke and his Worship subsequently drinking of the water from a fountain temporarily erected on the spot. An address was then presented to the Duke by the Mayor and Corporation. The Mayor subsequently entertained the Duke and some 200 guests. During the repast, the Mayor, in proposing the health of the Company, coupled with the name of the noble Chairman, referred to the strained relations which had hitherto existed between them and the Corporation as a matter of past history, and said he was sure that in the future the energy displayed by the Directors to overcome the difficulties they had to contend with would enable the Corporation and the Company to work together in the interests of the town. His Grace, in reply, acknowledged the courtesy of the Mayor, and, while deprecating the action taken by the Corporation, said it was due to panic more than to any real cause. He felt sure that the interests of the Company were only those of the town; and while he would not say that he had not looked upon his investments in the Company from a financial point of view, still he could declare that it had not been his principal reason in being engaged in the work, for although he was, he believed, the principal shareholder in the Company, it did not by any means represent the more important interest he had in the town and neighbourhood in other directions.

The Town Commissioners of Newry, Ireland, have accepted a tender for the erection of a bench of 24 retorts, in four ovens of sixes, upon the regenerative system patented by Mr. G. R. Hislop, of Paisley.

Ladies attending lectures on cookery have been frequently heard to express regret that they have not provided themselves with note-books in which to jot down *memorabilia* in connection therewith. Messrs. Richmond and Co., Limited, have determined that the utility of these lectures shall not suffer on this account, for they have had printed for distribution at gas exhibitions a small note-book in an ornamental cover, which may be turned to good account.

CARBURETED WATER-GAS APPARATUS

MERRIFIELD—WESTCOTT—PEARSON PATENTS.

THE

ECONOMICAL GAS APPARATUS CONSTRUCTION Co., Ld.

W. H. PEARSON, President.
W. H. PEARSON, Junr., Vice-President.
J. T. WESTCOTT, M.E., Manager.
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London Offices: SUFFOLK HOUSE, LAURENCE POUNTNEY HILL, E.C.
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TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

Carbureted Water-Gas Engineers.

The Complete Plant for the

BIRMINGHAM CORPORATION

WILL HAVE A

GUARANTEED DAILY CAPACITY OF 8 MILLION CUBIC FEET,

AND A

MAXIMUM CAPACITY OF 10 MILLION CUBIC FEET.

An Illustrated Advertisement of the Plant will appear next week.

GWYNNE & BEALE'S

PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 65,095.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

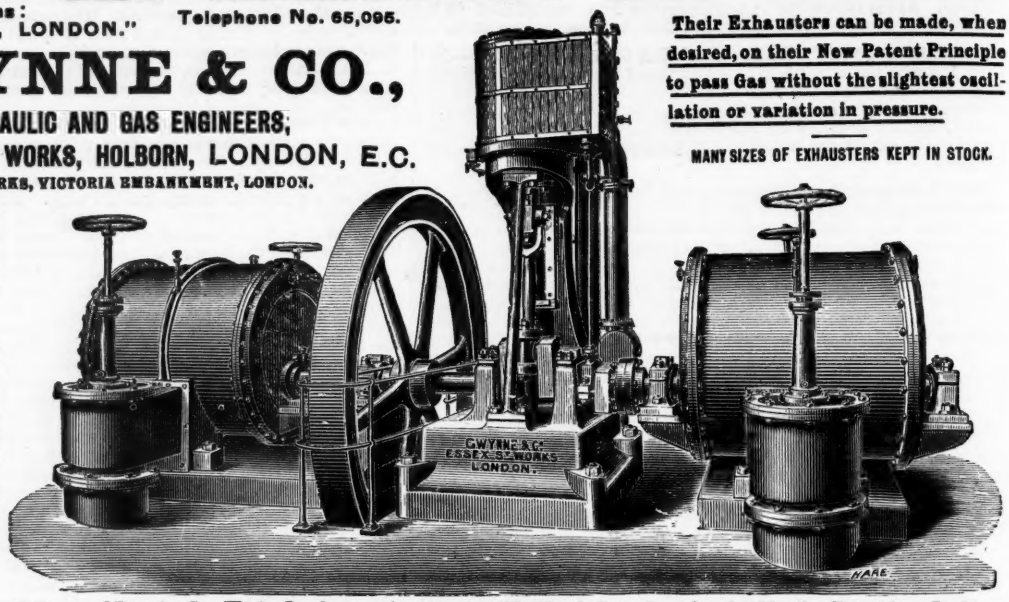
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 22,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

JOHN WM. O'NEILL, Managing Director, Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works.

ANDREW STEPHENSON, 182, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.

Telegrams: "Volcanism, London."

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE wanted.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

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TUBES for Gas, Steam, and Water (all Sizes), Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.

JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 297, last week's issue.)

Telegrams: "HUTCHINSON BROS., BARNSLEY."

J. & J. BRADDOCK, Globe Meter Works, Oldham.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER LINCOLN."

[For Illustrated Advertisement, see Aug. 3, p. 250.]

SADLER & Co., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.

Correspondence invited.

Telegraphic Address: "Sadler, Middlesbrough."

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO., VICTORIA PAINT WORKS, MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.

Please write for Estimate before ordering elsewhere.

ALEX. P. KER, C.E., Consulting Gas Engineer, Hunton Road, Gravelly Hill, Birmingham, 25 Years Assistant Engineer and Manager of Works to the Corporation of Birmingham and their predecessors, MAY BE CONSULTED on all matters connected with GAS ENGINEERING, including Valuations, Alterations, Additions and Extensions, &c. REPORTS upon EXISTING WORKS and IN PROGRESS. EXAMINATIONS OF GAS for ILLUMINATING POWER and IMPURITIES conducted. Plans, Specifications, and Estimates prepared.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.

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Telegrams: "BOGORE, LONDON."

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JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special Attention to Repairs.

Before placing Orders, please write for Estimate.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE OF ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application.

70, CHANCERY LANE, LONDON, W.C.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.

Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

TO GAS AND WATER OFFICIALS.

SPECIAL and Favourable Terms for CYCLES are offered. The very best "up-to-date" Cycle at a reasonable Cost. "Dunlop" Tyres, Weldless Tube throughout, "Westwood" Rims, "Brook's" Saddle, "Perry's" or "Renold's" Chain, &c. The whole combining to make as fine a Machine as is possible to be made. Satisfaction guaranteed. Send at once for Catalogue post free.

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ECONOMY IN PURIFICATION.

INCREASE the Efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.

References and Particulars can be obtained from the Makers—

C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.

And J. EVERY & SON, Phœnix Iron-Works, LEWES.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

TRAVELLER, with good Connection among Gas Companies, is open to ENGAGEMENT, or would take MANAGEMENT and TRAVEL when required. Undeniable References.
Address No. 2886, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION Wanted as Main and SERVICE LAYER and GENERAL FITTER, or as WORKING FOREMAN of small Works. Can read Meters, &c. First-class References.
Address No. 2896, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

YOUNG Man (age 23) desires engagement on Water-Works as WASTE-WATER INSPECTOR. Understands the Deacon System, and office work connected with same. Excellent Testimonials.
Address No. 2893, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER (age 27), who has been for TwelveYears with one of the leading Gas Companies, and has a thorough knowledge of Fittings and Office Work, will be pleased to hear of a RESPONSIBLE POSITION. Highest References.
Address No. 2890, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HINCKLEY URBAN DISTRICT COUNCIL.

WANTED, at once, a good Main and SERVICE LAYER for a month or two.
Apply to G. HELPS, Gas-Works, HINCKLEY.

FOREMAN Wanted for Gas-Stove Fitting Shop.
State (by letter) Age, Experience, and Wages required, to No. 2894, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STOKER Wanted. Must be a good Shovel Charger, and used to Engine and Exhauster. Wages 24s. per week. Constant job to a steady Man.
Apply for further Particulars, to C. JEFFERY, Manager, &c., Gas-Works, Portland, DORSET.

PRACTICAL Working Gas Manager wanted at once. Output 3 millions. Must understand Connecting Services. Good Wages, House, &c.
Apply, with References, to H. J. BAUGUST, Secretary, Gas Company, Castle Donnington, DERBY.

WANTED, a steady Stoker for a small Gas-Works in Shropshire. Must have good References (send *copies* only). Cottage, Gas, and Coal found.
State, by letter, Age and Wages required to No. 2891, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Stokers (Two) wanted, used to Shovel Charging, and Engine and Boiler. Permanent job to steady Men. Wages 4s. 6d. per twelve-hour Shift.
Apply, by letter only, to T. LAYTON, Manager and Secretary, Gas-Works, REDDITCH.

WANTED, at once, a Gas-Fitter, well up in both Iron and Compo., and all kinds of Fittings. Also a GAS STOKER, used to Shovel Charging and Engine and Boiler. Wages 31s. and 35s. per week. Permanent job to steady men.
Apply to J. GRIFFIN, Manager, Barking Gas Company, Hart Street, BARKING.

WANTED, a Foreman of Water-Works Pumping-Station in Staffordshire. Wages 32s. per week, with House and Coal.
Apply, in own handwriting, stating Age, Married or Single, and giving full Information as to previous Experience, with References or Testimonials, to No. 2888, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Gas Committee of Limerick invite APPLICATIONS for the post of GENERAL MANAGER of the Gas Department.
Salary £300 per Annum.
The Manufacture and Distribution of Gas are in charge of the Engineer.
Applications, under seal, endorsed "Gas Manager," and addressed to the Chairman of the Gas Committee, Gas Office, Limerick will be received up to Tuesday, the 31st inst.

By order,
ALFRED B. BAKER,
Secretary.

Corporation Gas Offices,
Limerick, Aug. 2, 1897.

WANTED, Second-hand Mouthpieces, BRIDGE and DIP PIPES, and HYDRAULIC MAIN, for Two Benches of Fives (15-inch Round Retorts). Also an EXHAUSTER and GAS-ENGINE, to pass 25,000 Cubic Feet per diem; and a VERTICAL CONDENSER, with 6-inch Connections.
Apply, by letter, to No. 2892, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

IMPORTANT TO GAS ENGINEERS AND MANAGERS.

YOUR old Retorts made as good as new by Repairing them with CROWTHER'S STICK-FAST FIRE CEMENT. Can be used in Hot or Cold Retorts. Unequalled for the Repair of Inclined Retorts. Satisfaction Guaranteed.
Write CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

FOR SALE—150 £1 Shares in the Rick- MANSWORTH AND UXBRIDGE VALLEY WATER COMPANY. Mains within 9 miles of Hyde Park, London.
Apply to G. LANE, Gas-Works, AYLESBURY.

FOR SALE—A Station Meter complete, in thorough working order. Recently overhauled and certified correct by Messrs. Braddock. Capacity, 50,000 feet per hour.
Apply to JOHN H. DARBY, Brymbo, near WREXHAM.

FOR SALE—A Set of four Purifiers, 12 feet square and 6 feet deep, with a 12-inch Walker's Dry Centre-Valve and 12-inch Connections.
Also a 12-inch STATION GOVERNOR.
Further Particulars and Price on application to W. WINSTANLEY, Gas-Works, Newcastle, STAFFS.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 18-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Two Gasholders: One 18 ft. diameter by 14 ft. deep; and the other 20 ft. by 14 ft. In good condition, with Columns, Girders, Counterbalance Valves, and Connections complete. Also an EXHAUSTER, by Gwynne and Beale (capacity 2000 feet per hour). Has only been used Six Months.
Apply to the DRAYCOTT GAS COMPANY, Draycott, DERBY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also COMPLETE WORKS equal to 7000, 20,000, 60,000 cubic feet per diem. **Inquire and compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

BOROUGH OF CHORLEY.

THE Chorley Corporation invite Tenders for the supply of the following for their Gas-Works—viz.,
GAS COAL, 7000 Tons, from the 1st of January to the 1st of September, 1898.
LIME, 350 Tons } for Twelve Months, from the
VITRIOL, 80 Tons } 1st of September next.
Forms of Tender for Coal and Vitriol, and any further Information, may be obtained on application to Mr. John M'Cubbin, Gas Manager.
Tenders, duly endorsed, to be sent to me on or before Tuesday, the 17th of August.
The Corporation do not bind themselves to accept any tender.

By order,
JNO. MILLS,
Town Clerk.

BOROUGH OF CHORLEY.

TO TAR DISTILLERS AND OTHERS.

THE Chorley Corporation invite Tenders for the purchase of the surplus TAR produced at their Gas-Works for Twelve Months from the 1st of September next, delivered in the Contractor's Tanks at either of the Chorley Railway Stations.
Any further Information may be obtained from Mr. John M'Cubbin, Gas Manager.
The Corporation do not bind themselves to accept the highest or any tender.
Tenders, endorsed "Tar," to be sent to me on or before Tuesday, the 17th of August, 1897.

By order,
JNO. MILLS,
Town Clerk.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Cor- poration invite TENDERS for the supply in whole or in part of 35,000 Tons of GAS COAL for the Year ending Sept. 30, 1898.
Particulars and Form of Tender can be obtained on application to the undersigned at the Gas-Works.
Tenders, sealed and endorsed "Tender for Gas Coal," to be sent in not later than noon of the 26th day of August, 1897, addressed to M. B. Dodds, Esq., Town Clerk, Stockton-on-Tees.
The Gas Committee do not bind themselves to accept the lowest or any tender.

WILLIAM FORD,
Engineer and Manager.

Gas-Works, Stockton-on-Tees,
Aug. 3, 1897.

CORPORATION OF ILKESTON.
GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of 6000 tons of GAS COAL for delivery during Twelve Months following Sept. 1, 1897.
Forms of Tender may be had on application to Mr. F. C. Humphrys, Gas Manager.
The Committee reserve the right to divide the Contract, and do not pledge themselves to accept the lowest or any tender.
Tenders, properly endorsed, to be sent to me not later than noon, Aug. 16, 1897.

By order,
WRIGHT LISSETT, Town Clerk.

Town Hall Ilkeston.

COUNTY BOROUGH OF WIGAN.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Wigan Cor- poration invite TENDERS for the surplus TAR produced at their Gas-Works for One Year, commencing on the 1st of September next, and terminating on the 31st of August, 1898.
Particulars and Form of Tender may be obtained on application to the undersigned.
The highest or any tender not necessarily accepted.
Tenders, sealed and endorsed "Tar," to be delivered to J. J. Charnock, Esq., Town Clerk, on or before the 17th of August next.

JOS. TIMMINS, Engineer.

Borough Gas-Works, Wigan,
July 27, 1897.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Offices, Willoughby Lane, Tottenham, on Saturday, the 28th day of August inst., at half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Statement of Accounts for the Half Year ended the 30th day of June, 1897, to declare a Dividend for the same period, and for the Election of two Directors and an Auditor for the ensuing Year, and for transacting the General Business.
The TRANSFER BOOKS WILL BE CLOSED for CONSOLIDATED STOCKS from the 13th to the 30th of August inst., both days inclusive.

By order,
JAMES RANDALL, Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
Aug. 6, 1897.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Herby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Albion Tavern, Aldersgate Street, in the City of London, on Friday, the 27th day of August, 1897, at Half-past Twelve o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 14th to the 27th of August, both inclusive.

By order of the Board,
ALFRED LASS,
Secretary.

Offices: 30, Gracechurch Street,
London, July 23, 1897.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on Friday, the 27th day of August, 1897, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ending the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 14th to the 27th of August, both inclusive.

By order of the Board,
ALFRED LASS,
Secretary.

Offices: 30, Gracechurch Street,
London, July 30, 1897.

COLNEY HATCH GAS COMPANY.

NOTICE OF GENERAL MEETING.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, New Southgate, on Thursday, the 26th day of August inst., at Five o'clock in the Evening precisely, to receive the Report of the Directors, and the Accounts of the Company for the Half Year ended the 30th of June, 1897, to declare Dividends, and for other purposes.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Offices: 5, Great Winchester Street,
London, E.C., Aug. 10, 1897.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Power.
He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.
Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.
Offices: 18, FINSBURY CIRCUS, E.C.

PUBLICATIONS
ISSUED BY
WALTER KING,
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ALL PARCELS SENT CARRIAGE FREE.

THE FLOW OF GASES & PROPORTIONING GAS-MAINS. — FOUR DIAGRAMS (with explanatory pamphlet). Invented by F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E. Price 7/6, Demy 4to., Limp Cloth.

CONSPIRACY AND PROTECTION OF PROPERTY ACT.—It is required, under a Penalty of FIVE POUNDS, that a printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat. Printed copies of this section, in large type, on broad sheets, price 2/- per dozen, or 10/6 per 100. The Act extends to Scotland and Ireland.

ORDERS FOR OTHER TECHNICAL PUBLICATIONS WILL BE EXECUTED AT PUBLISHERS' PRICES.

E. ASQUITH & CO.,
Hydraulic Engineers,
17, Mather Street, Ancoats, Manchester,
Fit up Plants for
Pressing Anthracene, Naphthalene, &c.
Competent Men sent out to erect same. Estimates given.

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CANDLE SAFETY LAMPS
Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

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Steam, Manufacturing, & Gas Coals & Cannel
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Samples and Prices on application.
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Gas Companies are solicited to try Samples of the
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RAVENSTHORPE, NEAR DEWSBURY.

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Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
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Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
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PRESENT DAILY PRODUCE OVER 4000 TONS.
LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.
Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.
HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.
PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.
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Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.
The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*
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THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

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MANUFACTURERS OF
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STEEL OF ALL DESCRIPTIONS.
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BOGHEAD CANNEL.
Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

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HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

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W. RICHARDSON, Fitter.

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ANALYSIS.

Yield of Gas per ton .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

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Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

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THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895,*

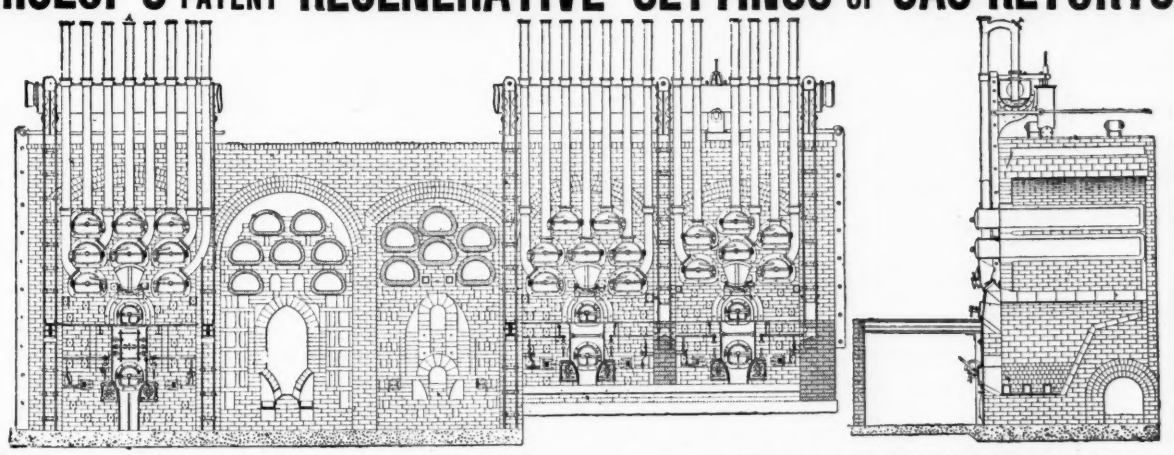
Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 17 TO 20 CWT. OF ENGLISH AND 20 TO 24 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, Hamilton, Agent for Scotland and Ireland; Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B., and to whom all Inquiries should be addressed in the first instance.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non*

TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.

Further Information and Pamphlets from Principal Agent.

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IN CONSEQUENCE OF MISREPRESENTATIONS WHICH HAVE BEEN CIRCULATED RESPECTING THE SUNLIGHT MANTLES, THE FOLLOWING CERTIFICATE IS NOW GIVEN WITH EVERY MANTLE:—

"The New Incandescent (Sunlight Patent) Gas Lighting Company, Limited, hereby certify that the within Mantle is in every respect similar in process of Manufacture and constituent parts or substances to the Mantle which was held by the Hon. Mr. Justice Wills **NOT TO BE AN INFRINGEMENT OF THE WELSBACH PATENTS."**

AND WE FURTHER CALL ATTENTION TO THE EXTRACTS FROM THE JUDGMENT GIVEN BY THE HON. MR. JUSTICE WILLS, WHEN HE DISMISSED THE WELSBACH COMPANY'S APPLICATION FOR INJUNCTION:—

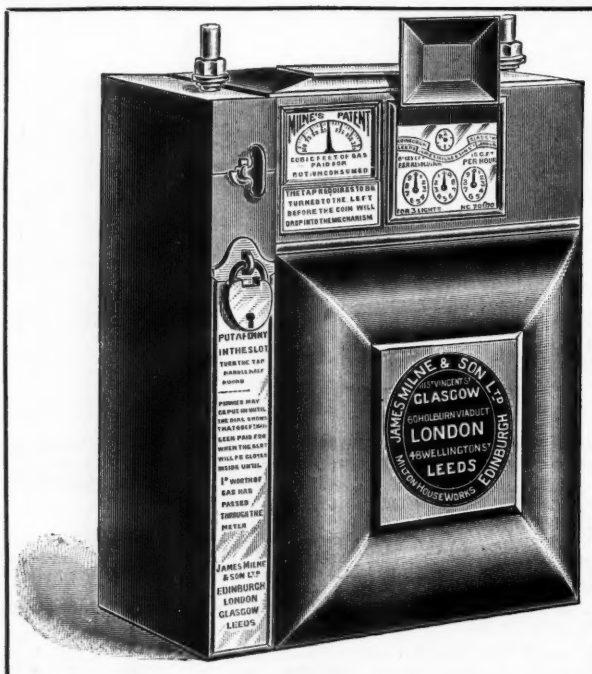
"No use is made by the Sunlight Company of any of the rare earths; and their choice of substances, and their method of applying the illuminants, appear to me to be **as wide asunder as the Poles** from those contemplated by Welsbach."

"Welsbach Company's Counsel both admit that they have no case unless the Welsbach skeleton, of whatever resistant earth oxides composed, is within the Welsbach Patent. It seems to me that **this is just what Welsbach did not claim.**"

PRICE LIST AND TERMS ON APPLICATION.

THE NEW INCANDESCENT (SUNLIGHT PATENT) GAS LIGHTING Co., LIMITED.

33 & 34, Shoe Lane, London, E.C.



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MILNE'S PATENT PREPAYMENT DRY METER.

MOST compact Attachment in the Market.

Same Height as an Ordinary Meter.

Cast-Iron Attachment Cover, with extra large Money-Box, which is withdrawn while opening Door.

Absolutely Positive in Action.

The Whole Mechanism always in Gear.

The following unsolicited comparison has been sent us as showing the exact correspondence of amount due per Index and Cash in Money-Box with these Meters as against those of other Makers:—

Milne's	Meter due per	Index	3/4	Cash in Box	3/4
Milne's	,,	,,	4/2	,,	4/2
Milne's	,,	,,	2/6	,,	2/6
Milne's	,,	,,	3/4	,,	3/4
Milne's	,,	,,	2/6	,,	2/6
Two other Makers.	,,	,,	6/8	,,	6/11
	,,	,,	1/8	,,	2/0
	,,	,,	3/9	,,	5/2
	,,	,,	2/6	,,	2/8
	,,	,,	4/7	,,	6/0

Wrought-Iron

And Fittings and Accessories.

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MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF
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MANUFACTURERS OF
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GLAZED BRICKS AND PORCELAIN BATHS.

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Proprietors of
ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.
ALDWARKE MAIN GAS COAL
Analysis: 12,600 Feet of 19-Candle Gas per Ton.
Value in Pounds of Sperm, 820·80.
VERY FREE FROM IMPURITIES.
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D. HULETT & CO., LTD.
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GAS SERVICE CLEANSERS.
LAMP TORCHES.
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PRICE LISTS ON APPLICATION.

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SOLE AGENTS FOR
HISLOP'S
PATENT REGENERATIVE FURNACES
FOR
ENGLAND, WALES & ABROAD.
RETORT BENCHES ERECTED COMPLETE
WITH OR WITHOUT SPECIAL FURNACES.
RESULTS GUARANTEED.
OVENDEN HALIFAX
Designs and Estimates on Application.
GASEOUS FIRING A SPECIALTY.

"RANGITOL"

READY MADE INCANDESCENT LIGHT PREPARATION,
Powder or Liquid, of Best Quality, supplied Cheap by
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Manufacturer of Chemicals, PANKOW-BERLIN.
Nitrate of Thorium, Chemically Pure, at lowest Prices.
SAMPLES FREE ON APPLICATION.

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MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

PETTIGREW'S PATENT
Sulphate of Ammonia Plant
ON THE CONTINUOUS SYSTEM
Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
Old Systems easily and cheaply converted.
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
Write for Particulars, Testimonials, and References to
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R. DEMPSTER & SONS, LIMITED.

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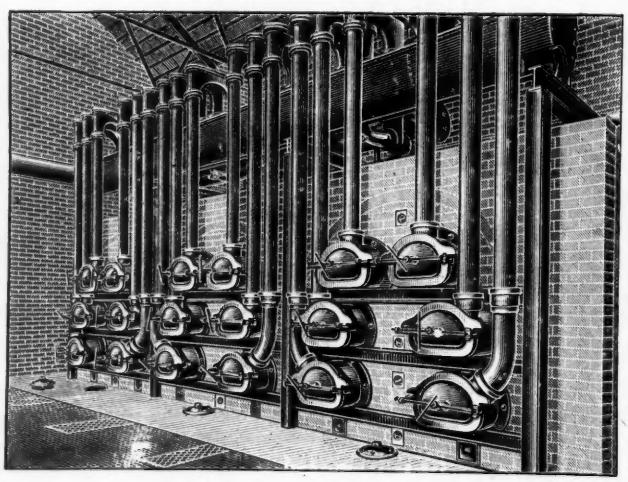
GENERATOR AND REGENERATOR FURNACES AND SETTINGS
OF EVERY DESCRIPTION suitable for LARGE OR SMALL GAS-WORKS.

Retort-Houses with Complete Installations, both Horizontal and Inclined Regenerator Settings.



Coal and Coke Crushing, Elevating, and Conveying Plant, all on the latest approved Designs.

REFERENCE TO ENGINEERS WHERE RETORTS ARE IN OPERATION.

PLANS AND ESTIMATES ON APPLICATION.

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CARBURETTED WATER-GAS PLANT.

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ADOPTED AT HORNSEY, HASTINGS, SOUTHEND,

PLYMOUTH, BUENOS AYRES, SOUTHALL (BRENTFORD GAS COMPANY).

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OF EVERY SIZE AND DESCRIPTION.

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IT IS STRONG AND CHEAP, AND REQUIRES NO PIERS FOR ITS SUPPORT.

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DUDLEY,

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Patent REGENERATIVE SETTINGS,

GIBBONS & MASTERS' PATENT No. 1269, 1893.

SUITABLE FOR WORKS OF EVERY CAPACITY,

AND A SPECIAL FORM OF WHICH IS APPLICABLE TO

GASEOUS FIRING WITH A MINIMUM EXCAVATION.

RETORT-BENCH IRONWORK, CONDENSERS,

SCRUBBERS, PURIFIERS, VALVES, &c.

DESIGNS AND ESTIMATES ON APPLICATION.

THE "TRAFALGAR"

PREPAYMENT GAS-METER

FOR PENCE, SHILLINGS, OR ANY COINAGE.

THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
2. Absolute Accuracy.
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4. Unaffected by irregularities in shape or thickness of the penny.
5. Can be fixed to any ordinary Wet or Dry Meter.
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7. Price Changer can be altered without otherwise disturbing the Meter.
8. Index showing number of pennies in the mechanism at any time.
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GUARANTEED FOR FIVE YEARS.

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Manufacturers of Wet and Dry Gas-Meters.
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No. 59 Peckham.

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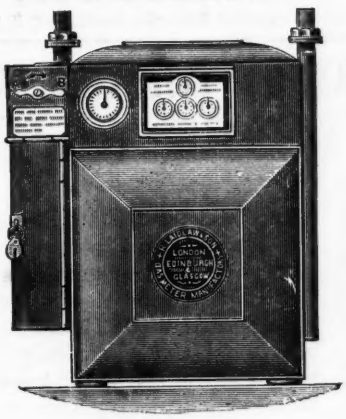
GAS & WATER ENGINEERS.

MANUFACTURERS OF WET & DRY GAS-METERS,

SIEMENS WATER-METERS,

PREPAYMENT GAS-METERS.



—DRY METER.—

—WET METER.—

EDINBURGH: SIMON SQUARE WORKS. | **GLASGOW:** ALLIANCE FOUNDRY. | **LONDON:** 6, LITTLE BUSH LANE

COLUMNLESS GASHOLDERS

ON PEASE'S STEEL CABLE SYSTEM.

Great Saving in Cost, and Absolutely Reliable in Working.

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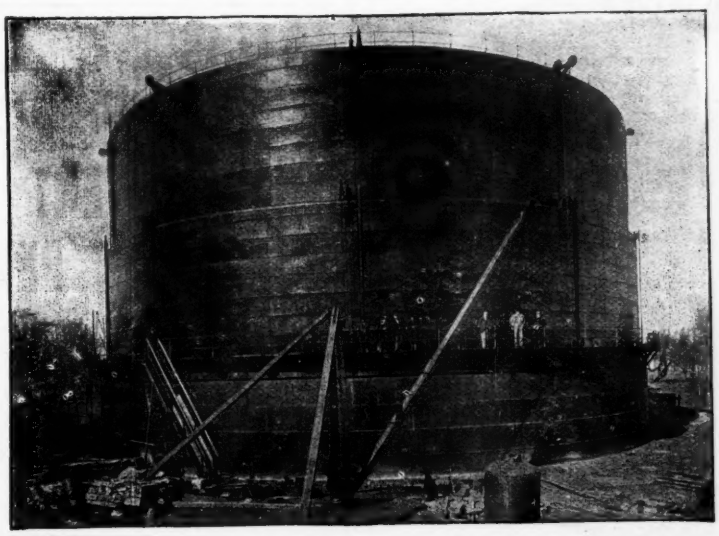

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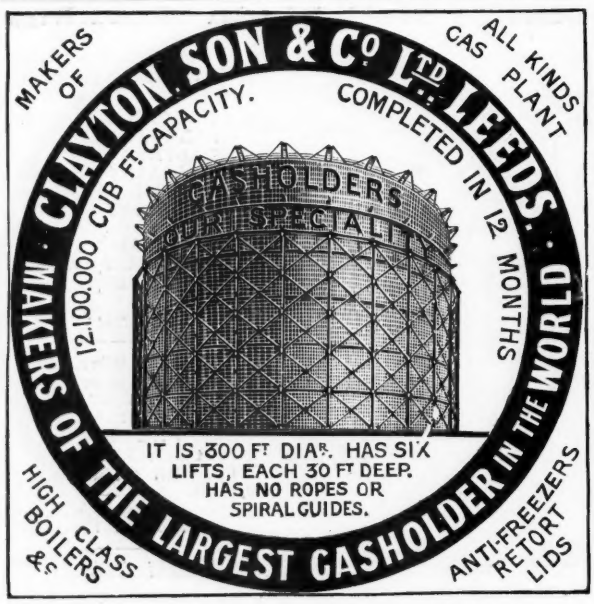
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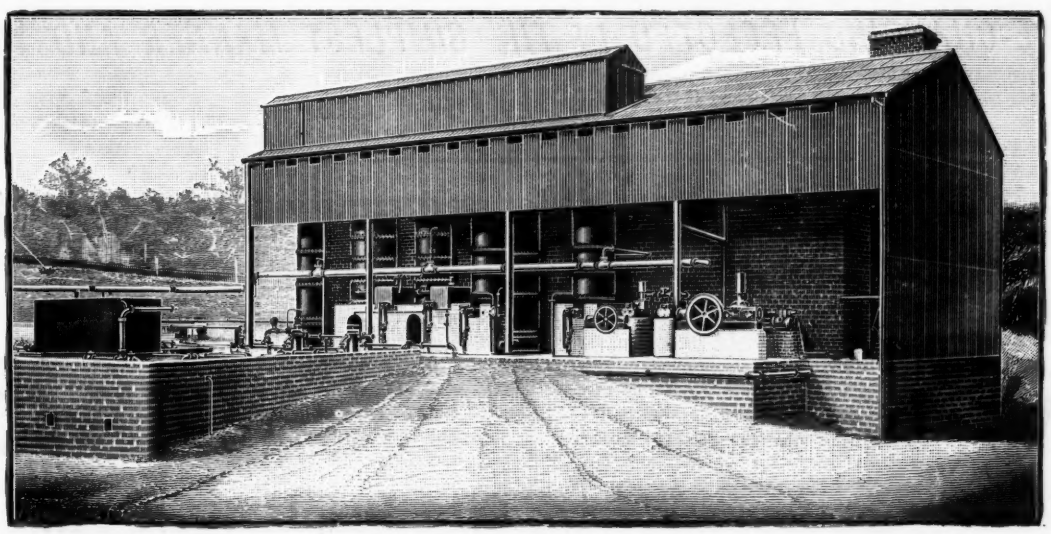

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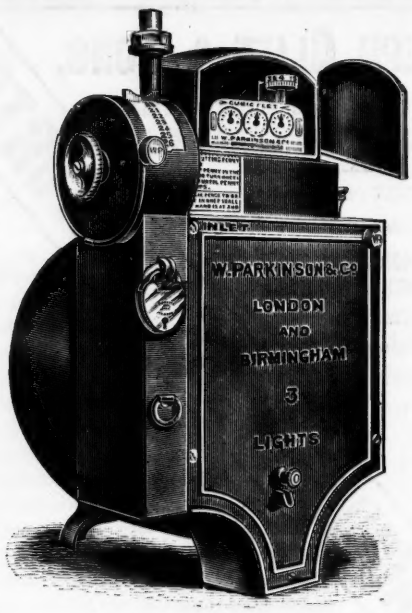

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[See also Advt. p. 310.

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